Fish

Shortnose Gar (*Lepisosteus platostomus*) State Rank: S1

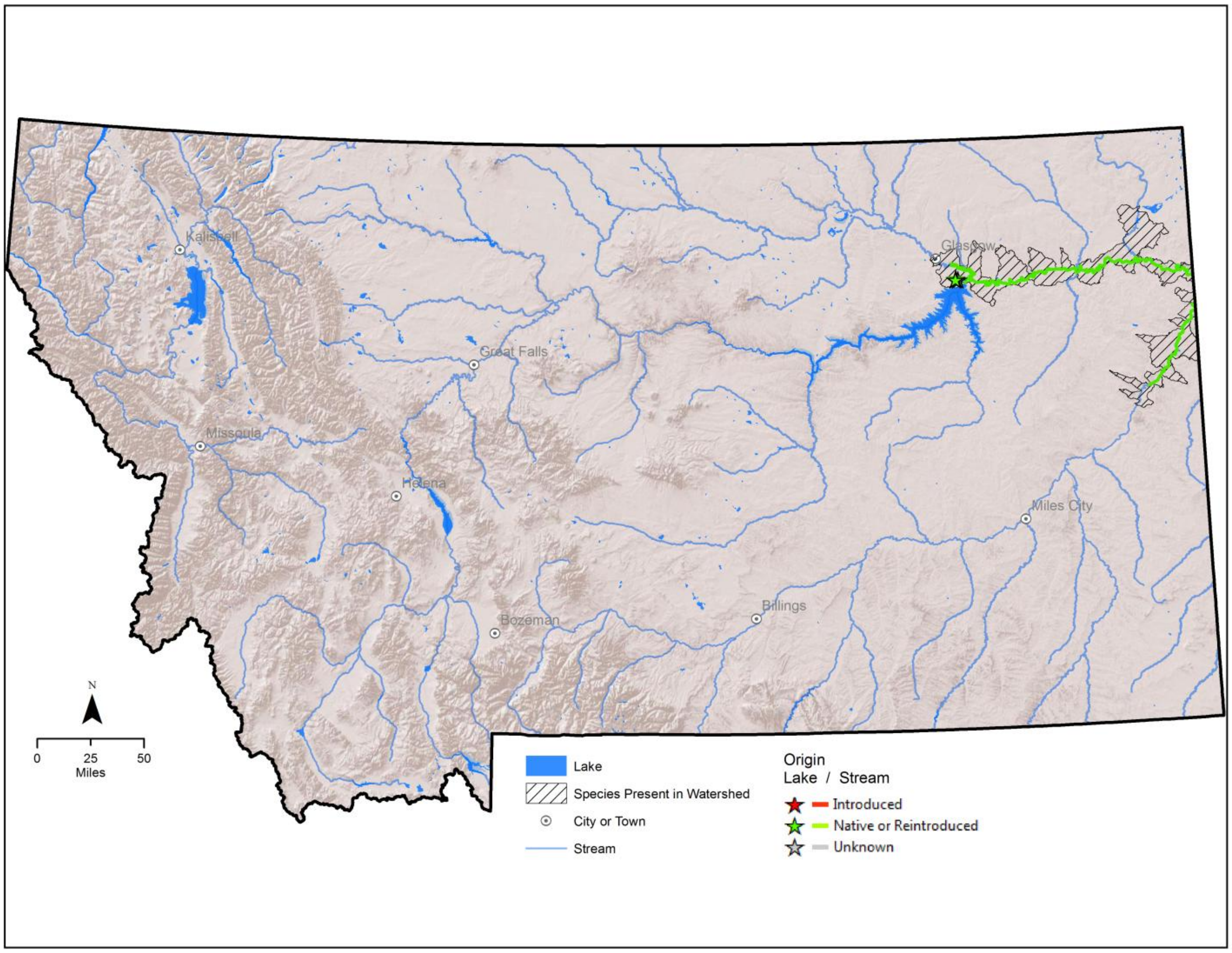

Figure 71. Distribution of shortnose gar

Habitat

Due to its limited distribution little is known about the shortnose gar within Montana. The shortnose gar is typically found in large rivers, quiet pools, backwaters, and oxbow lakes. It has a higher tolerance to turbid water than the other four gar species found in North America (AFS website 2013). Gar also have the unique ability to supply a highly vascularized swim bladder with supplemental oxygen by engaging in a behavior of "breaking," where air is gulped at the surface (Pflieger 1975). This allows gar to occupy waters with extremely low dissolved oxygen concentrations, which would not be suitable for most other fish inhabitation.

Management Plan

Montana Fish, Wildlife & Parks. 2013. Montana Statewide Fisheries Management Plan, 2013-2018. Montana Fish, Wildlife & Parks, Helena, Montana. 478 pp.

Shortnose Gar Current Impacts, Future Threats, and Conservation Actions

Current Impacts	**Future Threats**	**Conservation Actions**
Backwater habitat filled in for agriculture and modified by lack of channel maintenance flows	Backwater habitat filled in for agriculture and modified by lack of channel maintenance flows	Protect the current habitat integrity of the Fort Peck Dredge Cuts
Cold water release, lack of turbidity, and artificial hydrograph below Fort Peck Dam may inhibit abundance in the lower Missouri River	Cold water release, lack of turbidity, and artificial hydrograph below Fort Peck Dam may inhibit abundance in the lower Missouri River	Manage water regimes to better represent natural water regimes
Limited information in Montana	Limited information in Montana	Consider preparing a management plan for the shortnose gar or include it into other comprehensive taxonomic plans Increase survey and monitoring efforts

Pearl Dace (*Margariscus margarita*) State Rank: S2

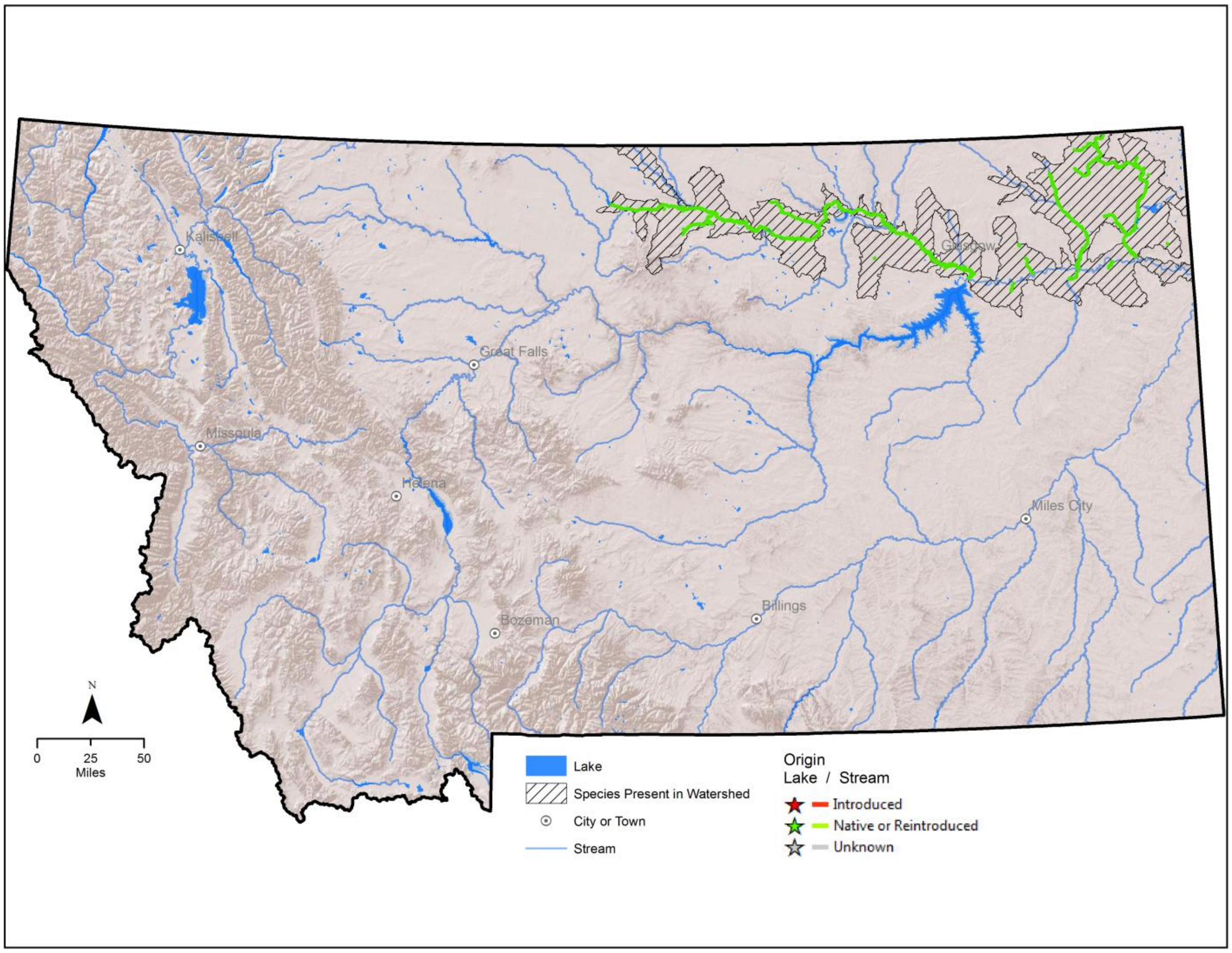

Figure 72. Distribution of the pearl dace

Habitat

Pearl dace occur in lakes, cool bog ponds, creeks, and cool springs (Scott and Crossman 1973). Little habitat-related information exists for this species in Montana. At four stream locations where pearl dace were captured in northeastern Montana, average stream widths ranged from 17.7-38.7 feet, average thalweg depths ranged from 1.3-4.6 feet, substrates ranged from 53%-100% fine substrate (less than 0.06 mm), and aquatic macrophytes were sparse to very heavy (less than 10% to more than 75% coverage; Bramblett, unpublished data). Eleven fish species were associated with pearl dace in seven collections from four sites on four Montana streams.

Pearl dace appear to prefer cool to cold water temperatures. In Canada, pearl dace were more often found to co-occur with brook trout (*Salvelinus fontinalis*) and mottled sculpin (*Cottus bairdi*) at water temperatures of 60.4-61.9 degrees F than with smallmouth bass (*Micropterus dolomieu*) and rock bass (*Ambloplites rupestris*) at 69.4-70.7 degrees F (Becker 1983). The upper lethal temperature for pearl dace was found to be 88.0 degrees F (Becker 1983). In the southernmost part of their range in Maryland and Virginia, pearl dace were found in streams that were cool in summer and warm in winter, with substantial spring-water input (Tsai and Fava

1982). In Montana, pearl dace were captured in streams with daytime water temperatures from July through September ranging from 49.3-73.6 degrees F (Bramblett, unpublished data).

Management Plan
Montana Fish, Wildlife & Parks. 2013. Montana Statewide Fisheries Management Plan, 2013-2018. Montana Fish, Wildlife & Parks, Helena, Montana. 478 pp.

Pearl Dace Current Impacts, Future Threats, and Conservation Actions

Current Impacts	**Future Threats**	**Conservation Actions**
Anthropogenic stressors that increase water temperatures Diversion impacts and high water demands from oil and gas, livestock, agriculture, municipal developments	Anthropogenic stressors that increase water temperatures	Work with landowners and land management agencies to limit activities that may be detrimental to this species Work with landowners and conservation districts to use BMPs on their land
Limited distribution in Montana renders it vulnerable to extirpation from the state	Limited distribution in Montana renders it vulnerable to extirpation from the state	Consider preparing a management plan for the pearl dace or include it into other comprehensive taxonomic plans Fish surveys supported by voucher specimens should be conducted in streams across the range (including areas of historical records) of the species to better determine its geographic range
Populations vulnerable to predation and competition	Populations vulnerable to predation and competition	Review opportunities to reduce pike abundance in prairie streams where native minnows are present Continue to scrutinize any northern pike stockings, which currently only occur in large multi species reservoirs (Fort Peck Reservoir)
	Climate change altering habitat characteristics (e.g., air and water temperature, precipitation timing and amount)	Continue to evaluate current climate science models and recommended actions Maintain connectivity Monitor habitat changes and address climate impacts through adaptive management as necessary

Current Impacts	Future Threats	Conservation Actions
		Routinely monitor known populations
	Collection by anglers seeking bait minnows	Educate anglers on species identification and importance of native fish

Sicklefin Chub (*Hybopsis meeki*) State Rank: S1

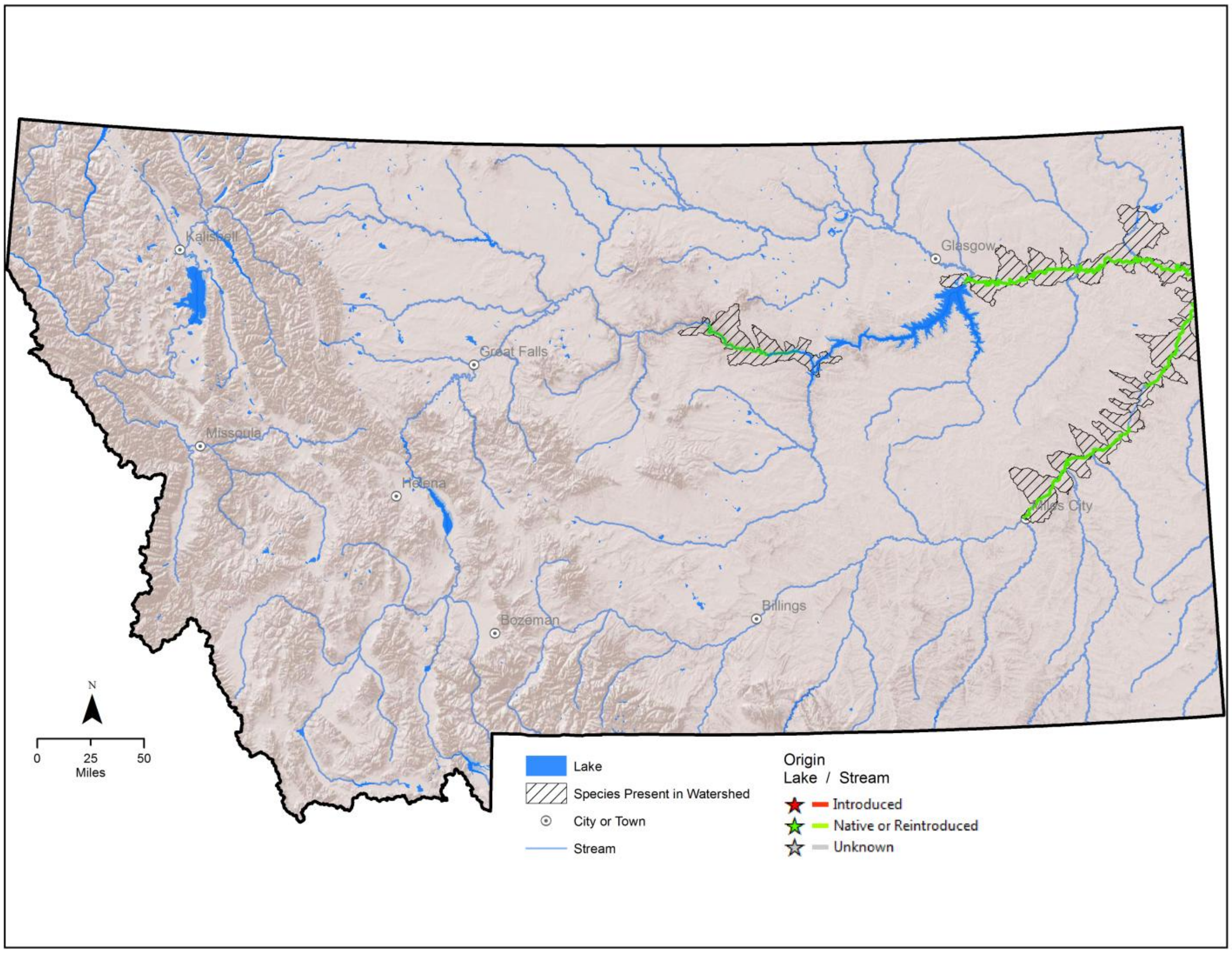

Figure 73. Distribution of sicklefin chub

Habitat

Sicklefin chub are strictly confined to the main channels of large, turbid rivers where they live in a strong current over a bottom of sand or fine gravel (Pflieger 1975).

Unlike the sturgeon chub, all of the Montana captures have been from only the Missouri and Yellowstone rivers, indicating a strong preference for large turbid rivers (AFS website 2013).

Management Plan

Montana Fish, Wildlife & Parks. 2013. Montana Statewide Fisheries Management Plan, 2013-2018. Montana Fish, Wildlife & Parks, Helena, Montana. 478 pp.

Sicklefin Chub Current Impacts, Future Threats, and Conservation Actions

Current Impacts	Future Threats	Conservation Actions
Channelization of the Missouri River due to irrigation operations and development	Channelization of the Missouri River due to irrigation operations and development	Work with landowners and other agencies to limit activities that may be detrimental to this species

Current Impacts	Future Threats	Conservation Actions
Decreased range and abundance of prey aquatic insect larvae due to dam construction	Decreased range and abundance of prey aquatic insect larvae due to dam construction and snag removal	Increase monitoring and survey efforts in eastern Montana to monitor population trends and range expansion or loss and collect additional information on life history and ecology Continue monitoring efforts in the Missouri River downstream of Fort Peck Dam
Habitat alteration by dam operations, reducing turbidities, and/or altering temperature and flow regimes Currently, the largest threat is cold water pollution from Fort Peck dam which limits habitat for species in the Missouri River	Habitat alteration by dam operations, reducing turbidities, and/or altering temperature and flow regimes	Restore more natural flow and temperature conditions in the rivers below mainstream and tributary dams
	Predation by non-native fish	Determine the effect of non-native fish on sicklefin chub
	Removal of wild individuals used for bait fish	Educate anglers on the identification and importance of native species

Sturgeon Chub (*Hybopsis gelida*) State Rank: S2S3

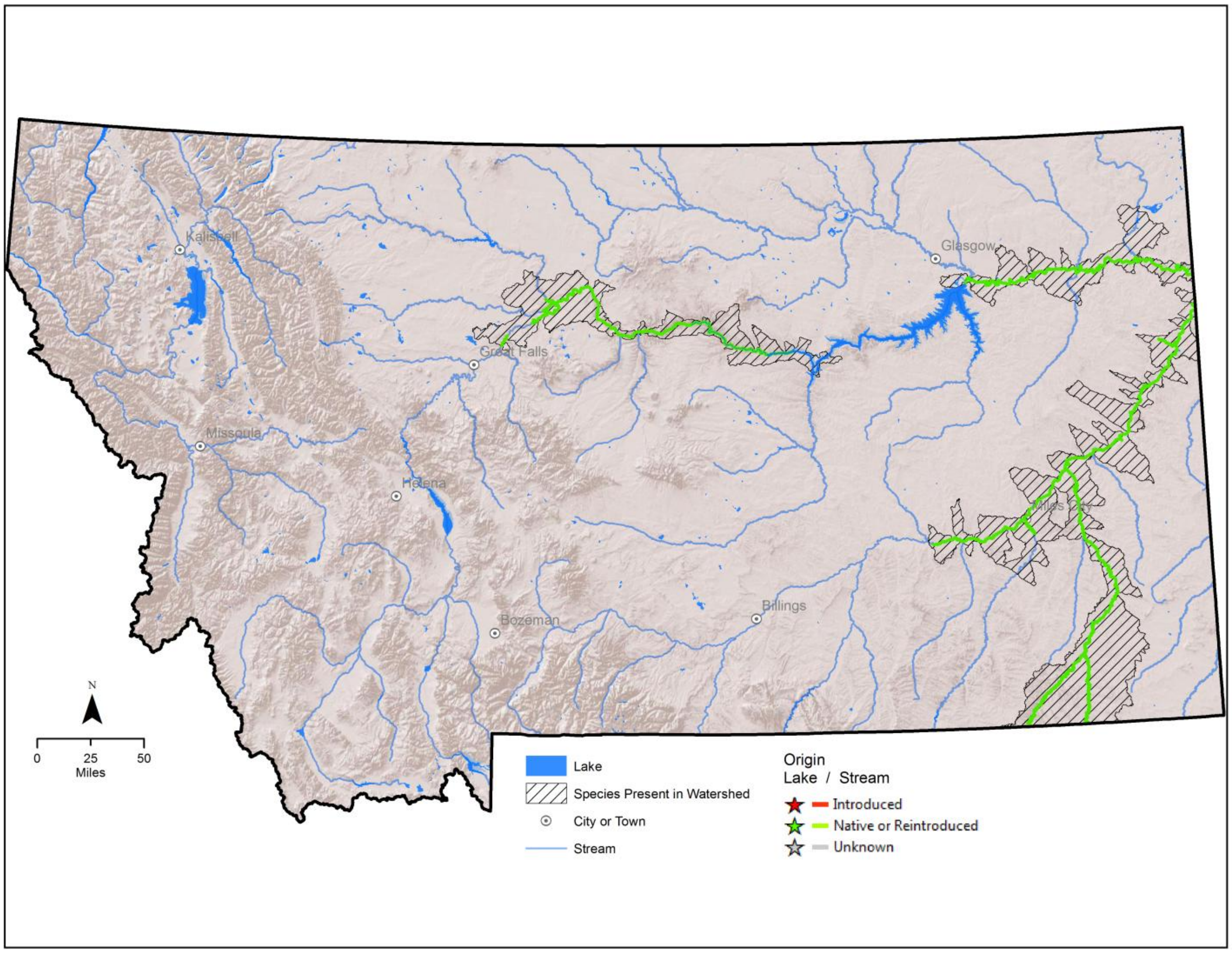

Figure 74. Distribution of sturgeon chub

Habitat

Sturgeon chub are highly adapted to life in turbid waters. Chub are most closely associated with sites having moderate currents and depths and sand or rock substrates (Baxter and Simon 1970; Brown 1976; Lee et al. 1980). In the Powder River, sturgeon chub were taken most frequently at sites with depths less than 20 inches and depth velocities of less than 35.4 inches/second at 23.6 inches in depth (Stewart 1981; Werdon 1992; Gould unpublished data).

Management Plan

Montana Fish, Wildlife & Parks. 2013. Montana Statewide Fisheries Management Plan, 2013-2018. Montana Fish, Wildlife & Parks, Helena, Montana. 478 pp.

Sturgeon Chub Current Impacts, Future Threats, and Conservation Actions

Current Impacts	Future Threats	Conservation Actions
Channelization of the Missouri River due to irrigation operations and development	Channelization of the Missouri River due to irrigation operations and development	Work with landowners and other agencies to limit activities that may be detrimental to this species

Current Impacts	**Future Threats**	**Conservation Actions**
Decreased range and abundance of prey aquatic insect larvae due to dam construction Food web disruption due to impoundments on mainstem rivers	Decreased range and abundance of prey aquatic insect larvae due to dam construction and snag removal	Increase monitoring and survey efforts in eastern Montana designed to monitor population trends and range expansion or loss and collect additional information on life history and ecology Continue monitoring efforts in the Missouri River downstream of Fort Peck Dam
Habitat alteration by dam operations, reducing turbidities and/or altering temperature and flow regimes Currently, the largest threat is cold water pollution from Fort Peck dam which limits habitat for species in the Missouri River	Habitat alteration by dam operations, reducing turbidities and/or altering temperature and flow regimes	Restore more natural flow and temperature conditions in the rivers below mainstream and tributary dams.
	Predation by non-native fish	Determine the effect of non-native fish on sturgeon chub
	Removal of wild individuals used for bait fish	Educate anglers on the identification and importance of native species

Paddlefish (*Polyodon spathula*) State Rank: S2

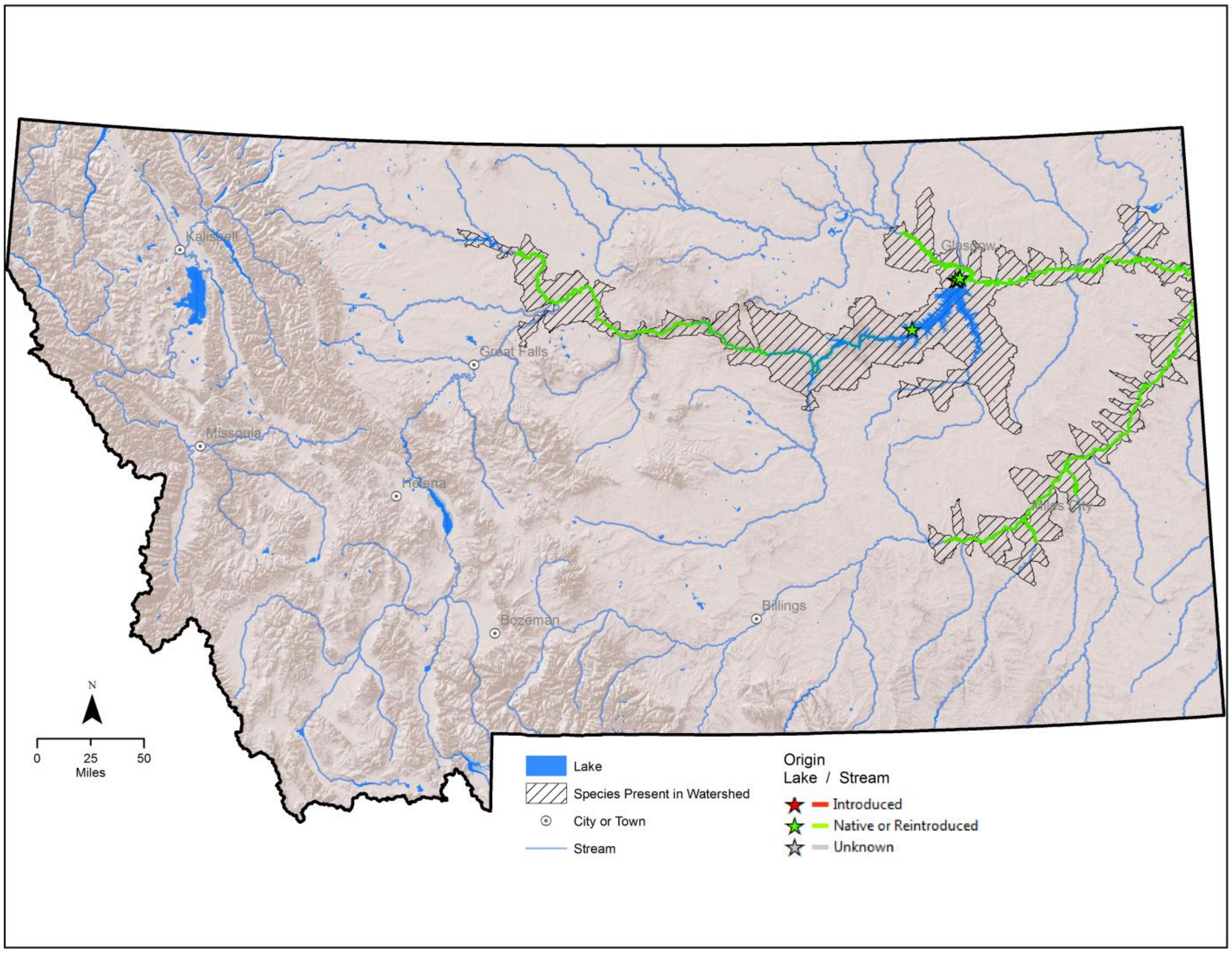

Figure 75. Distribution of paddlefish

Habitat

The paddlefish is a large river species that utilizes a wide variety of habitats seasonally and at different life stages. Optimal spawning habitat consists mainly of turbid, faster flowing main channel areas with gravel substrates, whereas feeding habitat is typically slower moving backwaters, side channels, and sloughs where their zooplanktonic food is more abundant. In the twentieth century, Montana's paddlefish have adapted successfully to feeding in Missouri River reservoir habitat, resulting in an increased population size over historical (pre-reservoir) levels (Scarnecchia et al. 1996). Young-of-the-year paddlefish utilize turbid headwater reaches of Fort Peck Reservoir (Kozfkay and Scarnecchia 2002) and Lake Sakakawea (Fredericks and Scarnecchia 1997) for particulate feeding. Larger juveniles and adults large enough to more effectively avoid predation (Parken and Scarnecchia 2002) filter feed throughout the reservoirs.

Management

Paddlefish stocks in Montana are adequate to support a recreational fishery. Current research and monitoring are designed to prevent over-harvest and insure a sustainable wild fishery. Paddlefish are managed as two naturally-reproducing stocks: the Yellowstone River and Missouri below Fort Peck Dam, and the Missouri River above Fort Peck Dam. The Yellowstone stock is managed cooperatively through a joint management plan with the State of North Dakota. Harvest of this recreational fishery is accomplished by snagging, and targets for each stock are set on an annual basis. Since 2010, the target has been 1,000 fish for the Yellowstone/lower Missouri and 500 fish for the Missouri upstream of Fort Peck Reservoir. The harvest is closely monitored by biologists and creel clerks and can be closed immediately or with 24 hours notice, depending on the location. One unique aspect of the Yellowstone fishery is the presence of a caviar operation, which is run by the Glendive Chamber of Commerce. Proceeds from this operation are divided between the City of Glendive and FWP, with the state's share going to help fund research and management activities for the species.

The population and demographics of each stock is recalculated annually for the purpose of evaluating the sustainability of the harvest. Details of the management goals and activities can be found in the interstate management plan, *Management Plan for Montana and North Dakota Paddlefish Stocks and Fisheries* (North Dakota Game and Fish Department and Montana Fish, Wildlife & Parks 2008).

<u>Management Plans</u>

Montana Fish, Wildlife & Parks. 2013. Montana Statewide Fisheries Management Plan, 2013-2018. Montana Fish, Wildlife & Parks, Helena, Montana. 478 pp.

North Dakota Game and Fish Department and Montana Department of Fish, Wildlife & Parks. 2008. Management Plan for North Dakota and Montana Paddlefish Stocks and Fisheries. Bismarck, North Dakota and Helena, Montana.

Paddlefish Current Impacts, Future Threats, and Conservation Actions

Current Impacts	**Future Threats**	**Conservation Actions**
Current operations of mainstem dams negatively influences all life stages and influences the amount of available habitat Cold water pollution from Fort Peck reservoir negatively impacts spawning and incubation, larval, and young of year growth	Future operations of mainstem dams could negatively influence all life stages and influence the amount of available habitat Cold water pollution from Fort Peck reservoir negatively impacts spawning and incubation, larval, and young of year growth	Continue to work with federal agencies to develop operational guidelines for mainstem dams that minimize impacts to paddlefish populations
Loss of spawning habitat	Loss of spawning habitat	Maintain instream flows and spawning habitat in large rivers (especially the Yellowstone River and Missouri River above Fort Peck Reservoir) Protect remaining spawning habitat

Current Impacts	**Future Threats**	**Conservation Actions**
		Operate Fort Peck Dam to mimic spring runoff and stimulate paddlefish spawning
Water depletions reduce rearing habitat	Water depletions reduce rearing habitat	Increase reservoir water retention during times of drought
	Climate change altering habitat characteristics (e.g., air and water temperature, precipitation timing and amount)	Continue to evaluate current climate science models and recommended actions Monitor habitat changes and address climate impacts through adaptive management as necessary Maintain connectivity Routinely monitor known populations
	Illegal harvest Overfishing	Continue sustainable management practices by FWP Continue to enforce existing paddlefish regulations
	Potential introduction of exotic competitors (e.g., bighead carp (*Aristichthys nobilis*))	Improve public awareness of paddlefish conservation concerns and impacts of non-native species

Sauger (*Sander canadensis*) State Rank: S2

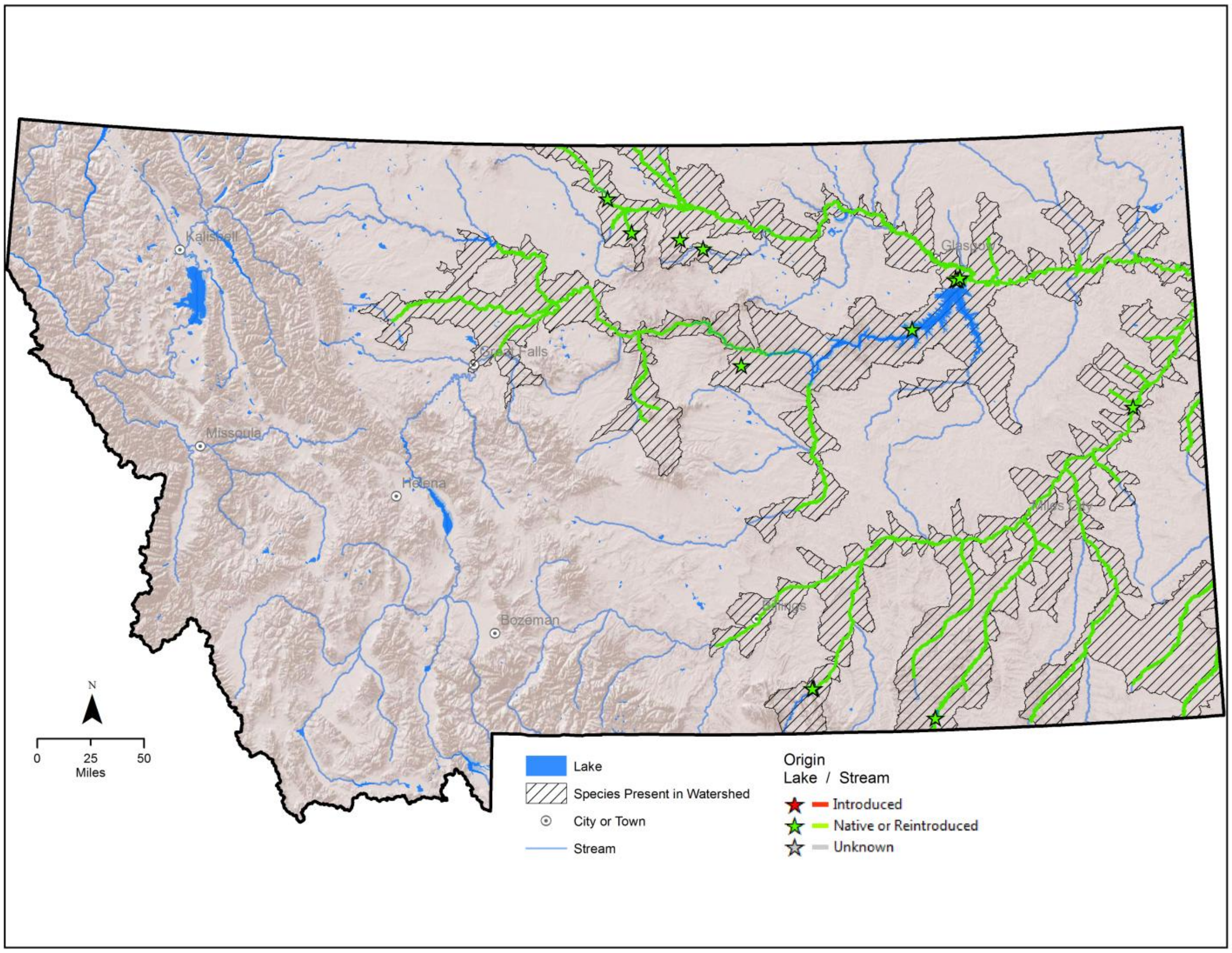

Figure 76. Distribution of sauger

Habitat

Sauger typically occur in large turbid rivers and shallow turbid lakes (Becker 1983). Turbidity is an important delineator of suitable habitat for sauger. Physiological adaptations, such as a highly advanced light-gathering retina, allow sauger to thrive in low-light environments (Ali and Anctil 1977; Crance 1987). At cool water mesotherms, sauger have a fairly wide range of thermal tolerance with occupied temperatures ranging from 33.8-86.0 degrees F and a physiological optimum of 64.4-75.2 degrees F (Crance 1987; Carlander 1997).

Sauger are heavily dependent throughout their life histories on unimpeded access to the wide diversity of physical habitats that are present in large river systems. They are considered to be the most migratory percid (Collette 1977). Their migratory behavior, which is primarily related to spawning, is well documented throughout their range with annual movements of up to 373 miles between spawning and rearing habitats (Nelson 1968; Collette et al. 1977; Penkal 1992; Pegg et al. 1997; Jaeger 2004). Sauger are highly selective for spawning sites and commonly travel long distances to aggregate in a relatively few discrete areas to spawn (Nelson 1968; Nelson 1969; Gardner and Stewart 1987; Penkal 1992). Although primary stem spawning does occur (Jaeger 2004), it has been suggested that sauger populations are strongly reliant on access to large tributaries for spawning (Nelson 1968; Gardner and Stewart 1987; Penkal 1992; Hesse 1994; McMahon 1999). Spawning locations are associated with unique geomorphic features, such as bluff pools and bedrock reefs, and rocky substrates over which sauger broadcast their eggs (Nelson 1968; Gardner and Stewart 1987; Hesse 1994; Jaeger 2004). During a 10- to 12-day period following emergence, it is thought that larval sauger drift long distances downstream - up to 186 miles - prior to gaining the ability to maneuver horizontally and begin feeding (Nelson 1968; Penkal 1992; McMahon 1999). Juveniles rear in side channels, backwaters, oxbows, and other off-channel habitats during spring and summer before shifting to primary channel habitats in autumn (Gardner and Berg 1980; Gardner and Stewart 1987; Hesse 1994). Adult sauger also use off-channel and channel-margin habitats during the spring and early summer periods of high flow and turbidity, and then move to deeper primary channel habitats in late summer and autumn as decreasing flows and turbidities cause suitable off-channel habitats to become unavailable (Hesse 1994; Jaeger 2004).

Management

Sauger have become rare or absent in a number of larger rivers in Montana (e.g., Judith, Poplar, Big Horn, Tongue rivers), due in part to dams, diversions, and impoundments that have altered temperature, flow regime and favored river habitats, and obstruct migrations. Additional management concerns include entrainment in irrigation canals, streambank alterations, and competition or hybridization with non-native species (e.g., smallmouth bass, walleye). Though it remains widely distributed in the Missouri and Yellowstone rivers, and is common in some locations, the sauger is listed as a Montana SOC owing to an estimated 50% reduction in distribution and widespread threats.

Sauger have received considerable management attention since reductions in abundance were first noted in the drought years in the 1980's. Several studies have since been completed to better understand the species overall status, habitat needs, movement patterns, and threats. These assessments have provided important information on habitat alteration impacts on sauger and other prairie river species (e.g., blue sucker, sturgeon, paddlefish), and recent restoration efforts have been directed towards reducing entrainment in irrigation canals, and promoting movement in the Tongue River through construction of a by-pass channel around an irrigation dam. Modifying dam operations to promote more natural hydrographs and temperatures on mainstem and tributary rivers will continue to be an important but difficult issue to address. Hybridization between sauger and non-native walleye is also a concern, and the issue is being preemptively addressed in the Bighorn River system through stocking of sterile walleye in Yellowtail Reservoir.

On larger rivers, spring and fall aggregations of sauger are popular fisheries, though overall less than 0.2% of statewide angling pressure is targeted towards the species. Standard angling limits are five daily and 10 in possession, though in many locations limits are reduced to one daily and two in possession to protect some sauger populations from the potential stress of over-harvest.

Management Plan

Montana Fish, Wildlife & Parks. 2013. Montana Statewide Fisheries Management Plan, 2013-2018. Montana Fish, Wildlife & Parks, Helena, Montana. 478 pp.

Sauger Current Impacts, Future Threats, and Conservation Actions

Current Impacts	Future Threats	Conservation Actions
Barriers that negatively influence spawning movement patterns and larval drift	Barriers that negatively influence spawning movement patterns and larval drift	Improve passage at several irrigation-related migratory barriers Strategically review opportunities to remove or provide passage at impoundments. Install fish screens and return structures to minimize entrapment of fish in irrigation canals
Channelization and loss of side channel habitat for larval and juvenile sauger	Channelization and loss of side channel habitat for larval and juvenile sauger	Work with landowners and conservation districts to implement BMPs through the 310 process to educate them on stream function and the importance of side channel habitat and the negative effects of channelization
Hybridization with walleye	Hybridization with walleye	Continue surveying and monitoring of species Stock triploid walleye where hybridization place sauger populations at risk
Negative interactions with other species such as walleye and smallmouth bass	Negative interactions with other species such as walleye and smallmouth bass	Conduct research to better understand interaction between sauger and non-native species Provide for supplemental stocking of native sauger to replace decreased walleye stocks in the Bighorn Reservoir
Reservoir operations that alter the natural hydrograph	Reservoir operations that alter the natural hydrograph	Regulate flow releases from dams throughout the year to maximize spawning success and year-class strength of sauger (Nelson 1968; Walburg 1972) Preserve natural hydrographs, natural processes of channel formation, and high degrees of connectivity where sauger currently exist

Current Impacts	**Future Threats**	**Conservation Actions**
Water withdrawals resulting in low river flows	Water withdrawals resulting in low river flows	Minimize the diversion of water from river channels and limit processes such as channelization and streambank armoring that result in loss of important off-channel habitats Work with landowners and other agencies to limit activities that may be detrimental to this species
	Climate change altering habitat characteristics (e.g., air and water temperature, precipitation timing and amount)	Continue to evaluate current climate science models and recommended actions Maintain connectivity Monitor habitat changes and address climate impacts through adaptive management as necessary Routinely monitor known populations
	Overexploitation	Continue to manage harvest as needed Continue to educate anglers on identification of sauger and walleye

Pallid Sturgeon (*Scaphirhynchus albus*) State Rank: S1

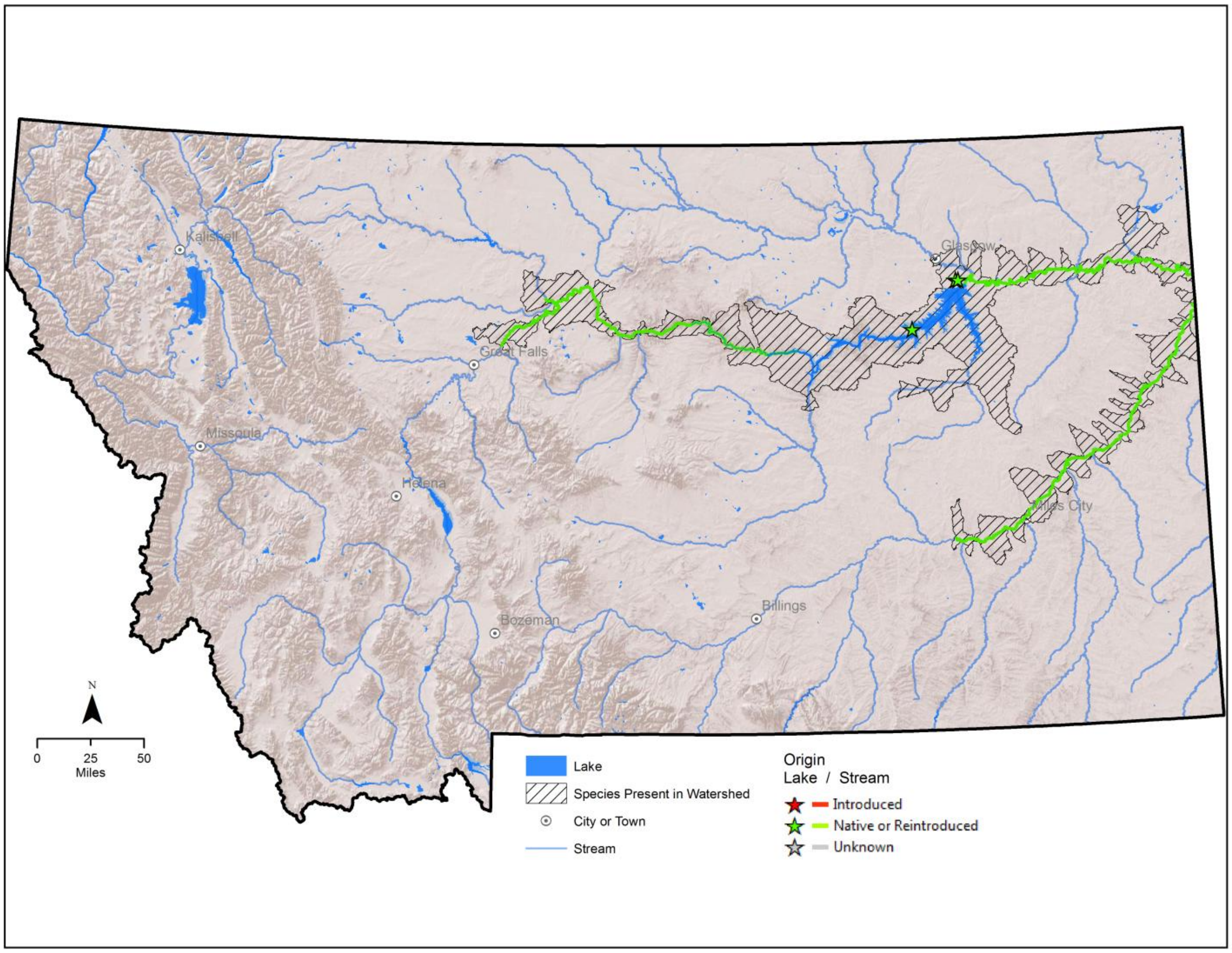

Figure 77. Distribution of the pallid sturgeon

Habitat

Pallid sturgeon use large, turbid rivers over sand and gravel bottoms, usually in strong current. In Montana, pallid sturgeon use large turbid streams including the Missouri and Yellowstone Rivers (Brown 1971; Flath 1981). They also use all channel types, primarily straight reaches with islands (Bramblett 1996). They primarily use areas with substrates containing sand (especially bottom sand dune formations) and fines (93% of observations; Bramblett 1996). Stream bottom velocities range between 0.0 and 4.5 feet per second, with an average of 2.1 feet per second (Bramblett 1996). Depths used are 2.0-47.6 feet, averaging 10.8 feet, and they appear to move deeper during the day (Bramblett 1996). Channel widths from 360-3,600 feet are used and average 1,063 feet (Bramblett 1996). Water temperatures used range from 37-68 degrees F. (Tews 1994; Bramblett 1996). Water turbidity ranges from 12-6,400 NTU (Turbidity Units) (Tews 1994).

Pallid sturgeon are long-lived (50+ years), highly migratory, and require large, turbid, relatively warm, and free-flowing rivers to successfully reproduce. The construction of dams and corresponding impoundments on the upper Missouri River beginning in the early 1900's, (e.g., Canyon Ferry and Fort Peck reservoirs, and North Dakota's Lake Sakakawea), Yellowstone

River (e.g., Intake Diversion Dam), and associated dammed tributaries (e.g., Yellowtail, Tongue, and Tiber reservoirs on the Bighorn, Tongue, and Marias rivers) have impeded successful spawning and recruitment of pallid sturgeon in Montana. Dams and impoundments block migration routes, alter natural spawning cues such as discharge, temperature and turbidity, fragment populations (i.e., above Fort Peck Reservoir), and alter habitats necessary for fry survival.

Management

Management plans and conservation efforts for pallid sturgeon are developed and implemented through a USFWS-coordinated Recovery Team that includes state- and federally-appointed staff. Short-term management objectives for the species include preventing local extirpation through population supplementation with hatchery-propagated fish, providing adult upstream passage at Intake Diversion Dam on the Yellowstone River, and developing strategies to address impacts to spawning and recruitment related to Fort Peck and Sakakawea reservoirs. Long-term and natural persistence of pallid sturgeon will require changes to reservoir operations that result in reestablishment of spawning cues and habitats necessary for fry survival. Though released hatchery reared juvenile pallid sturgeon number in the thousands, it is currently estimated that fewer than 120 adult pallid sturgeon persist in the upper Missouri and Yellowstone rivers above Lake Sakakawea.

Beginning in 1996, research efforts focused on pallid sturgeon recovery and preserving the pallid sturgeon genetic pool through collection of wild gametes and subsequent stocking of hatchery reared juvenile sturgeon. The primary purpose of the stocking program is to preserve the genetic pool and reconstruct an optimal population size within the habitat's carrying capacity (Krentz 1997; AFS website 2013). In 2000, USFWS completed an ESA consultation with USACOE regarding operation of Missouri River dams. Through an informal agreement the BOR agreed to provide a dominant discharge spring pulse out of the Tiber Reservoir every four to five years for Missouri River fish migrations that could help the Upper Missouri River pallid sturgeon population. To address pallid sturgeon passage and entrainment on the Yellowstone River, USFWS has begun consultation with BOR regarding problems at the Intake Diversion Dam. The future for pallid sturgeon recovery may continue to be uncertain even after positive changes have been implemented because pallid sturgeon populations are so depleted and the newly stocked fish will take at least 15 years before the females first reach sexual maturity and begin to spawn. Therefore, it is important to realize that immediate evaluations are impractical, and recovery will take a dedicated, long-term commitment (AFS website 2013). Implementing the pallid sturgeon recovery program in this area is a multistate and multiagency task. To facilitate this, the Montana/Dakota Pallid Sturgeon Work Group was organized in 1993. The group is comprised of representatives from FWP; South Dakota Game, Fish and Parks Department; USFWS; USACOE; BOR; Western Area Power Administration; and PPL-Montana, and acts in an advisory role identifying research needs and funding sources, developing work plans, and providing an opportunity for communication between biologists and agency personnel (AFS website 2013).

Management Plans

Dryer, M. P., and A. J. Sandvol. 1993. Recovery plan for the pallid sturgeon (*Scaphirhynchus albus*). U.S. Fish and Wildlife Service. Bismarck, North Dakota. 55 pp. *Currently under revision*.

Montana Fish, Wildlife & Parks. 2013. Montana Statewide Fisheries Management Plan, 2013-2018. Montana Fish, Wildlife & Parks, Helena, Montana. 478 pp.

Upper Basin Workgroup. 2008. Memorandum of Understanding for Upper Basin Pallid Sturgeon Recovery Implementation.

Pallid Sturgeon Current Impacts, Future Threats, and Conservation Actions

Current Impacts	Future Threats	Conservation Actions
Habitat modifications such as dams prevent movement to spawning and feeding areas; alter flow regimes, turbidity, and temperature; and reduce food supply Reservoirs have limited the distance of mainstem rivers, which is required for larval drift Cold water pollution decreases the carrying capacity of pallid sturgeon downstream of Fort Peck Dam	Habitat modifications such as dams prevent movement to spawning and feeding areas; alter flow regimes, turbidity, and temperature; and reduce food supply Continued operations of mainstem dams Future water withdrawals of both Yellowstone and Missouri Rivers and their tributaries	Protect minimum instream flow reservations to ensure that the pallid sturgeon population will not be impacted Restore more natural flow and temperature conditions in the rivers below mainstream and tributary dams Work with federal agencies to lengthen natural riverine habitat by strategically lowering reservoir elevations (i.e., Lake Sakakawea) In the Yellowstone River, ensure spawning habitat is available and accessible above Intake Dam and flows are adequate during spawning migrations to allow for successful spawning In the Missouri River, implement spring flows out of Fort Peck that are of adequate volume and duration to stimulate spawning and maximize the amount of river length for drifting larval pallids Provide passage over Vandalia Dam on the Milk River to enable successful spawning

Current Impacts	**Future Threats**	**Conservation Actions**
Low population numbers	Low population numbers	Establish a self-sustaining population through natural spawning and recruitment in the Middle Missouri, Lower Missouri, and Yellowstone rivers to prevent extinction Improve knowledge of pallid sturgeon life cycle requirements and continue to research limiting factors affecting existence
	Climate change altering habitat characteristics (e.g., air and water temperature, precipitation timing and amount)	Continue to evaluate current climate science models and recommended actions Monitor habitat changes and address climate impacts through adaptive management as necessary Maintain connectivity Routinely monitor known populations
	Lack of understanding or support of pallid sturgeon recovery efforts	Conduct public outreach to expand the appreciation for pallid sturgeon as a keystone species in Montana Build support for current and future conservation efforts for the species
	Upstream and nearby land use practices may degrade water quality	Work with landowners and land management agencies to limit activities that may be detrimental to this species
	Heavy metals and organic compounds may affect reproduction	Appropriate conservation action(s) unknown
	Hybridization with shovelnose sturgeon, possibly caused by reductions in habitat diversity	Appropriate conservation action(s) unknown

White Sturgeon (Kootenai River Population) (*Acipenser transmontanus*) State Rank: S1

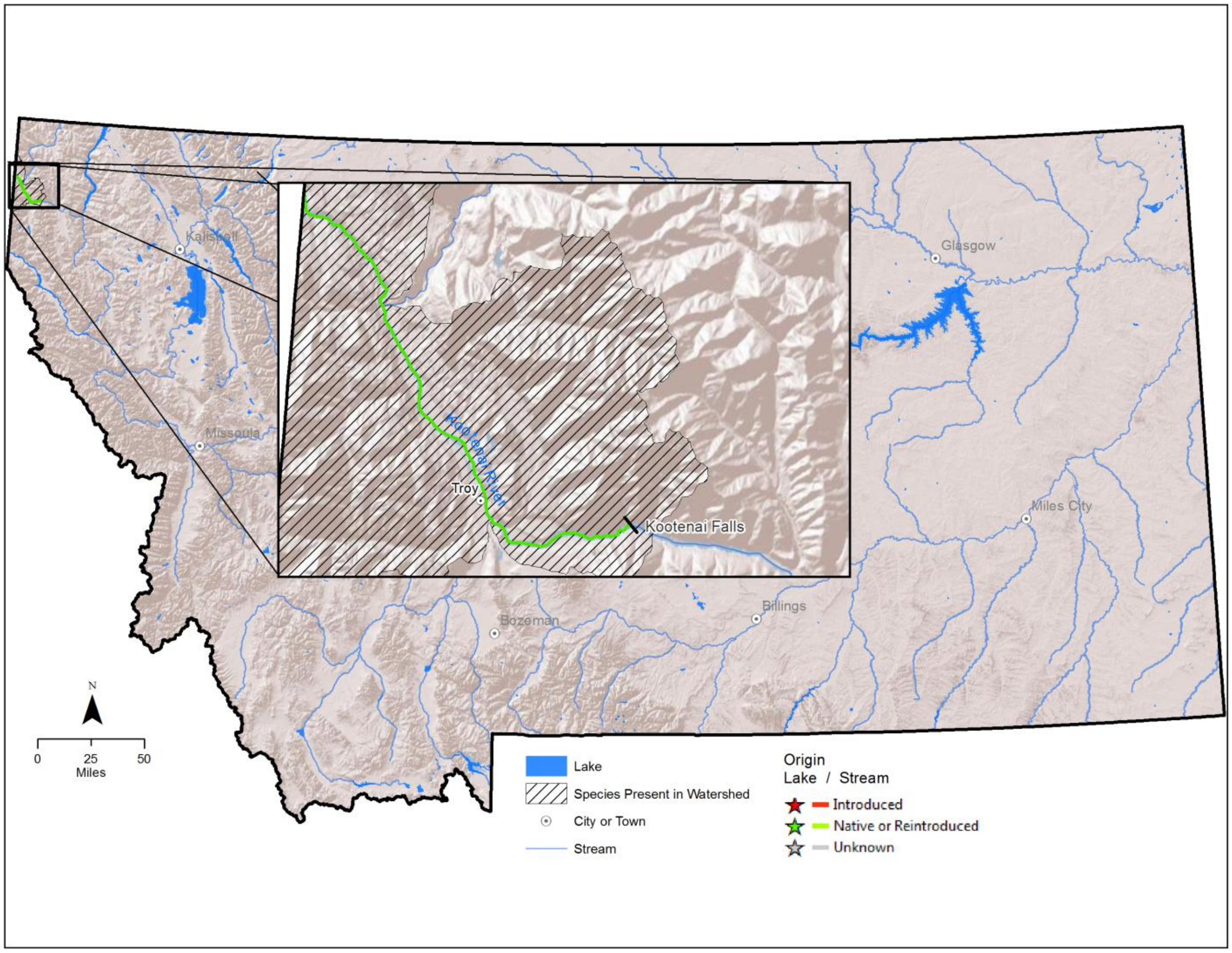

Figure 78. Distribution of white sturgeon

Habitat

The white sturgeon is landlocked in Montana and lives in the large, cool Kootenai River.

Management

Recovery of the white sturgeon population in the Kootenai River is contingent upon reestablishing natural recruitment, minimizing additional loss of genetic variability, and successfully mitigating biological and habitat alterations that continue to harm the population. Refer to the White Sturgeon Recovery Plan (USFWS 1999) for specific details promoting management of white sturgeon. The Kootenai River White Sturgeon Study and Conservation Aquaculture Project was initiated to preserve the genetic variability of the population, begin rebuilding natural age class structure, and prevent extinction while measures are implemented to restore natural recruitment (Anders and Westerhof 1996, USFWS 1999, Ireland 2000, Ireland et al. 2002). A breeding plan has been implemented to guide management in the systematic collection and spawning of wild adults before they are lost from the breeding population (Kincaid 1993). The implementation of the breeding plan includes measures to minimize potential detrimental effects of conventional stocking programs (AFS website 2013).

<u>Management Plan</u>
Montana Fish, Wildlife & Parks. 2013. Montana Statewide Fisheries Management Plan, 2013-2018. Montana Fish, Wildlife & Parks, Helena, Montana. 478 pp.

U.S. Department of the Interior, Fish and Wildlife Service. 1999. White Sturgeon: Kootenai River Population Recovery Plan. Region 1, USFWS, Portland, Oregon.

White Sturgeon Current Impacts, Future Threats, and Conservation Actions

Current Impacts	**Future Threats**	**Conservation Actions**
Recruitment failure: embryo suffocation, predation on early life stages, resource limitations, and possible intermittent female stock limitation	Recruitment failure: embryo suffocation, predation on early life stages, resource limitations, and possible intermittent female stock limitation	Continue the conservation aquaculture program to prevent extinction and preserve genetic variability
Reduced spring flows, unnatural flow fluctuations, and altered thermal regime caused by Libby Dam operation, which may have interrupted spawning behavior and recruitment	Reduced spring flows, unnatural flow fluctuations, and altered thermal regime caused by Libby Dam operation, which may have interrupted spawning behavior and recruitment	Coordinate flow fluctuations in Libby Dam to represent natural flows Restore riparian habitats and communities to increase productivity and river function Support restoration efforts of the Kootenai Tribe of Idaho
Limited understanding of species life history in Montana	Limited understanding of species life history in Montana	Continue to enforce an angling ban Continue trend/status monitoring to better understand how this species utilizes portions of the Kootenai River in Montana Participate on and support efforts of the Kootenai River White Sturgeon Recovery Team
	Climate change altering habitat characteristics (e.g., air and water temperature, precipitation timing and amount)	Continue to evaluate current climate science models and recommended actions Monitor habitat changes and address climate impacts through adaptive management as necessary Routine monitoring of known populations

Blue Sucker (*Cycleptus elongates*) State Rank: S2S3

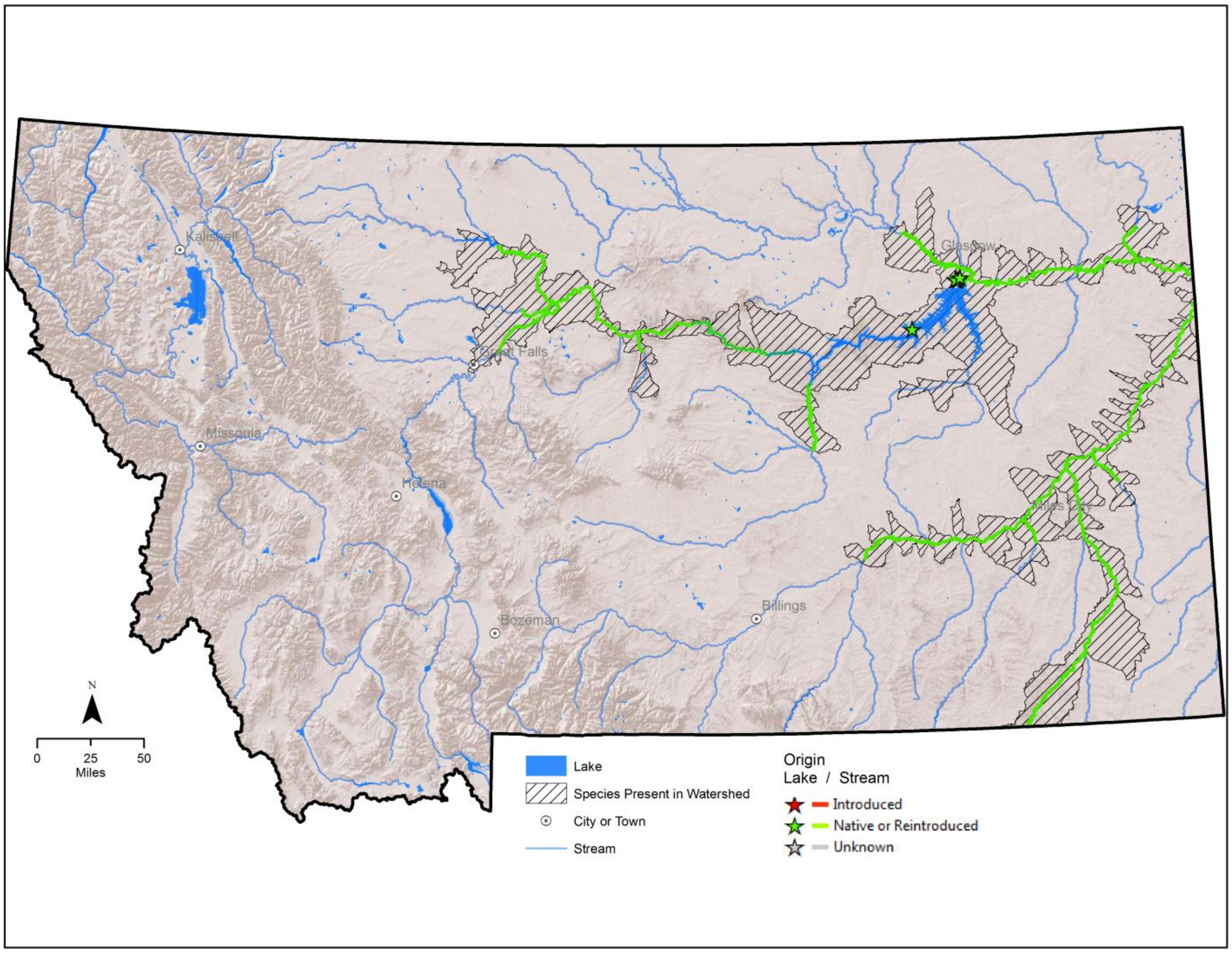

Figure 79. Distribution of blue sucker

Habitat

The blue sucker is adapted for life in swift currents with low turbidity. This fish prefers swift current areas of large rivers and feeding on insects in cobble areas (Moss et al. 1983). In the spring blue suckers migrate upriver and congregate in fast rocky areas to spawn. Large numbers have been observed migrating up tributary streams to spawn. The Tongue, Marias, Milk, and Teton rivers are the tributary streams most heavily used.

Management

Management of the blue sucker consists primarily of routine monitoring of population status and habitat protection. Currently, there is no management plan for blue suckers in Montana. The blue sucker is considered an indicator species for ecotype health because of its habitat-specific requirements, particularly migration needs that are impacted by barriers (i.e., diversions, impoundments). Current monitoring information indicates the populations are in stable condition.

Management Plans

Montana Fish, Wildlife & Parks. 2013. Montana Statewide Fisheries Management Plan, 2013-2018. Montana Fish, Wildlife & Parks, Helena, Montana. 478 pp.

Blue Sucker Current Impacts, Future Threats, and Conservation Actions

Current Impacts	**Future Threats**	**Conservation Actions**
Limited information on this species in Montana		Identify data gaps; improve understanding of the life history and possible limiting factors
Habitat changes and fragmentation caused by large dams that block passage to spawning grounds, alter stream flow, and eliminate peak flows that initiate spawning runs. Dams also discharge cold, clear water as opposed to the warm, turbid waters in which these species evolved	Habitat changes and fragmentation caused by large dams that block passage to spawning grounds, alter stream flow, and eliminate peak flows that initiate spawning runs. Dams also discharge cold, clear water as opposed to the warm, turbid waters in which these species evolved Continued reduction of instream flows Water withdrawals for energy development	Consider preparing a management plan for the blue sucker or include it in other comprehensive taxonomic plans Regulate water regimes to be more closely tied to natural water regimes
Changes in riparian habitat and less regeneration of woody trees and understory	Changes in riparian habitat and less regeneration of woody trees and understory	Continue conservation of habitats by implementing compatible grazing practices in riparian areas Ensure periodic inundation of floodplain to encourage cottonwood generation Work with landowners and land management agencies to limit activities that may be detrimental to this species
Loss of lateral habitats due to dam operations and continued bank armoring degrade natural habitat	Loss of lateral habitats due to dam operations and continued bank armoring degrade natural habitat	Protect natural minimum instream flow reservations

Current Impacts	Future Threats	Conservation Actions
	Climate change altering habitat characteristics (e.g., air and water temperature, precipitation timing and amount)	Continue to evaluate current climate science models and recommended actions Monitor habitat changes and address climate impacts through adaptive management as necessary Routinely monitor known populations

Arctic Grayling (*Thymallus arcticus*)* State Rank: S1

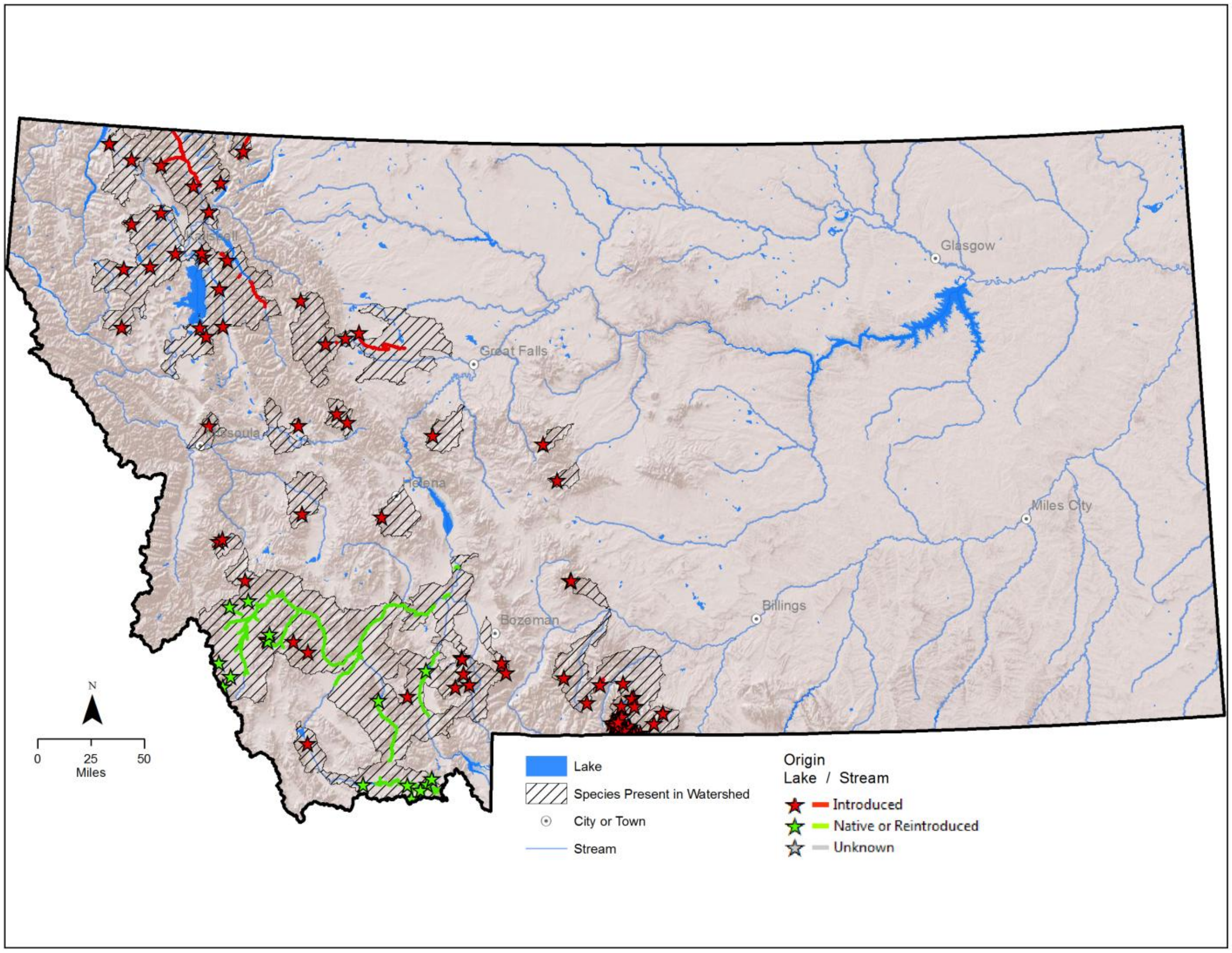

Figure 80. Distribution of Arctic grayling

Habitat

The arctic grayling occurs in both ponds/lakes as well as riverine systems; however, these differences make two distinct life histories of either adfluvial or fluvial populations. Cool temperatures are needed to sustain populations, and a gravelly substrate is needed for breeding purposes.

Management

On September 8, 2010, USFWS determined that the upper Missouri River basin Distinct Population Segment of Arctic Grayling warrants protection under the ESA, but that listing the species under the ESA is precluded by the need to address other higher priority listing actions. A proposed rule for potential ESA listing (endangered, threatened, or not warranted) will be issued in the fall of 2014, and a final rule in the fall 2015.

Habitat alterations are a key factor in the loss of fluvial Arctic grayling in most of their historic range in Montana. Over the last decade, in an effort to conserve and recover the remaining fluvial grayling population in Montana, FWP and numerous partners have engaged private landowners in the Big Hole Valley to aid grayling recovery through enhancement of habitat.

Implemented through a USFWS approved CCAA program, the goal of the effort is to secure Arctic grayling in the upper Big Hole River by improving streamflow, protecting and enhancing stream habitat and riparian areas, increasing fish passage, and eliminating entrainment of fish in irrigation ditches.

An Arctic Grayling Work Group meets on an annual basis to develop grayling conservation strategies and work plans. The technical advisory group is chaired by FWP and includes participants from state and federal resources agencies, universities, and private interest groups.

To formalize commitments to Arctic grayling conservation in Montana, in 2007, the *Memorandum of Understanding Concerning Montana Arctic Grayling Restoration* was developed and signed by numerous state, federal, and private stakeholders. The Memorandum commits the parties to a cooperative restoration program, and provides a means to obligate financial resources as they are available.

FWP has developed two conservation broods from aboriginal Big Hole River fluvial stock for fluvial grayling restoration purposes and occasional lake stocking in south-central Montana. The conservation broods, maintained in two lakes in the Madison and Gallatin river drainages, are to be used in efforts to reestablish native fluvial grayling in portions of their historic range, including most recently the Ruby River near Alder, Montana. A similar restoration effort in Elk Lake, near Lima, Montana, is being implemented to "replicate" the adfluvial aboriginal Red Rocks Lake population and expand the range of Arctic grayling to habitat it once occupied.

<u>Management Plans</u>

Montana Fish, Wildlife & Parks. 2007. Memorandum of Understanding Concerning Montana Arctic Grayling Restoration.

Montana Fish, Wildlife & Parks. 2013. Montana Statewide Fisheries Management Plan, 2013-2018. Montana Fish, Wildlife & Parks, Helena, Montana. 478 pp.

Montana Fluvial Arctic Grayling Workgroup. 1995. Montana Fluvial Arctic Grayling Restoration Plan. Montana Department of Fish, Wildlife & Parks, Helena, Montana. *Currently under revision*

U.S. Fish and Wildlife Service. 2006. Candidate conservation agreement with assurances for Arctic grayling in the upper Big Hole River. FWS Tracking # TE104415-0.

Arctic Grayling Current Impacts, Future Threats, and Conservation Actions

Current Impacts	**Future Threats**	**Conservation Actions**
Blockage of fish passage by irrigation diversions	Blockage of fish passage by irrigation diversions	Work with landowners and land management agencies to limit activities that may be detrimental to this species

Current Impacts	Future Threats	Conservation Actions
Low flows during severe drought decrease survival of older arctic grayling due to high water temperatures, increased susceptibility to predation, and diminished habitat volume	Low flows during severe drought decrease survival of older arctic grayling due to high water temperatures, increased susceptibility to predation, and diminished habitat volume	Conduct riparian rehabilitation projects on the Big Hole River Work with landowners and land management agencies to limit activities that may be detrimental to this species
Displacement by non-native rainbow and brook trout	Displacement by non-native rainbow and brook trout	Install barriers to prevent displacement or competition Determine the effect of non-native trout on Arctic grayling Reduce stocking of non-native fish Reintroduce grayling into areas where they formerly existed
Overharvest: Arctic grayling are easily caught by anglers	Overharvest: Arctic grayling are easily caught by anglers	Continue to modify harvest as needed
Riparian vegetation and streambanks affected by incompatible range or forest management practices, mass willow removal, and dewatering of the river for agricultural uses have negatively impacted fish habitat	Riparian vegetation and streambanks affected by incompatible range or forest management practices, mass willow removal, and dewatering of the river for agricultural uses have negatively impacted fish habitat	Assist private landowners with funding to improve habitat Continue to support Arctic grayling CCAA (USFWS 2006) Undertake habitat restoration and enhancement Support management of grazing to maintain riparian vegetation and streambank and channel stability in excellent condition
	Climate change altering habitat characteristics (e.g., air and water temperature, precipitation timing and amount)	Continue to evaluate current climate science models and recommended actions Monitor habitat changes and address climate impacts through adaptive management as necessary Routinely monitor known populations

* Only native or reintroduced populations will be addressed.

Bull Trout (*Salvelinus confluentus*) State Rank: S2

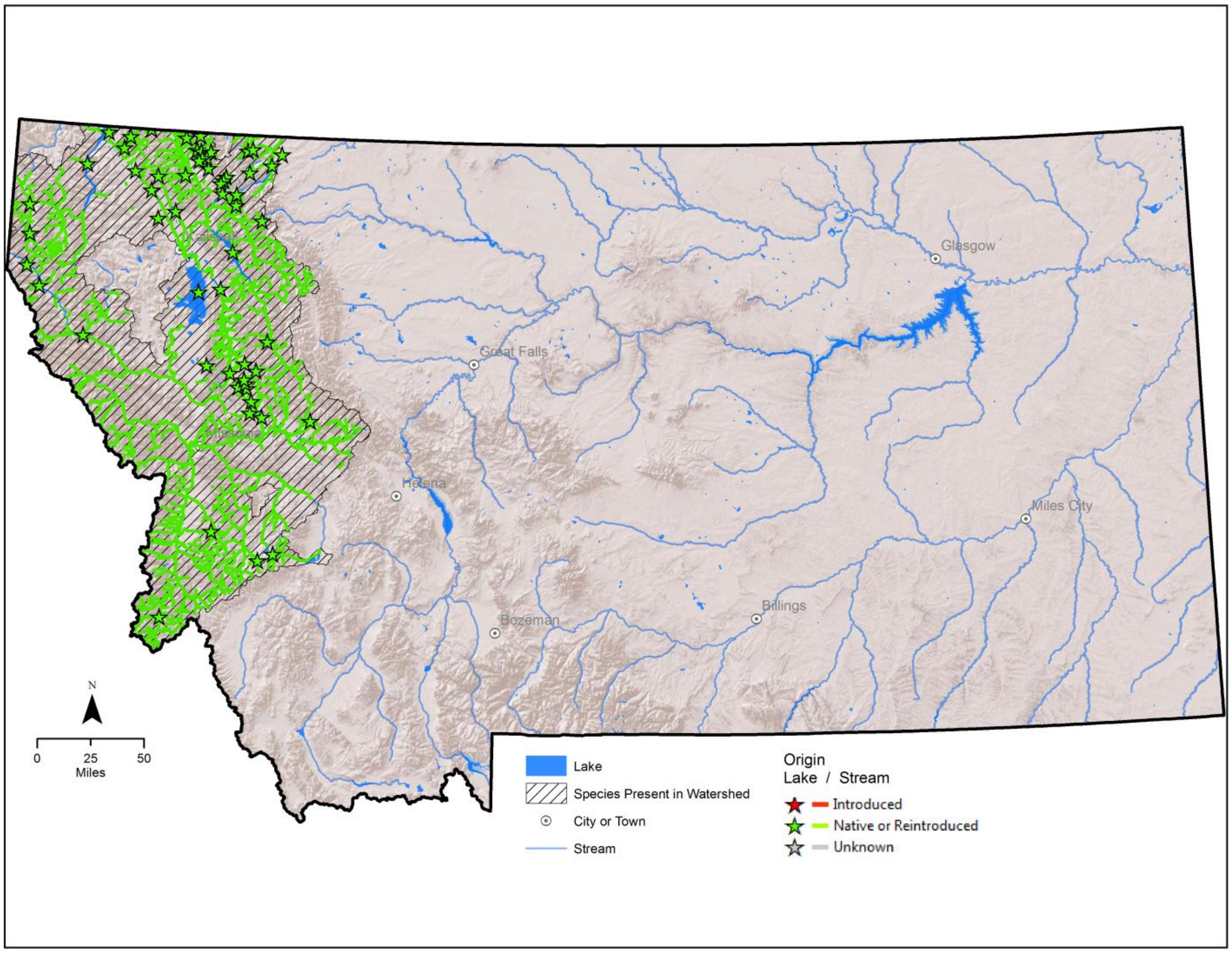

Figure 81. Distribution of bull trout

Habitat

Subadult and adult fluvial bull trout reside in larger streams and rivers and spawn in smaller tributary streams, whereas adfluvial bull trout reside in lakes and spawn in tributaries. A "resident" life history form, common in some areas, never leaves natal tributaries. Bull trout spawn in cold headwater streams with clean gravel bottoms (Brown 1971; Holton 1981).

Several studies report bull trout local population genetic divergence down to the geographic scale of adjacent tributaries (Leary et al. 1993; Kanda et al. 1997; Spruell et al. 1999; Taylor et al. 1999). Based on similar patterns of population genetic structure in steelhead, Parkinson (1984) suggested that populations in geographically adjacent streams be managed as separate stocks.

Management

While bull trout remain widespread in Montana, significant declines in abundance have been observed in most populations. Major causes for these declines include changes in habitat that reduce spawning success, barriers that prevent movement of migratory fish, and non-native fish (e.g. lake trout, brown trout, brook trout) that prey on or compete and hybridize with bull trout. Bull trout in the South Fork of the Flathead, above Hungry Horse Reservoir, remain a protected and robust population. Bull trout are a Montana SOC and were listed as an ESA threatened species by the USFWS in 1998 (USFWS 1998).

Because bull trout are a federally listed species, FWP and numerous state, federal, and private partners are active participants in their management and conservation. Habitat protection and restoration, and restoration of migratory corridors (e.g., removal of barriers to movement) are among key elements to bull trout conservation and recovery. The large-scale habitat restoration program in the Blackfoot Valley and the removal of Milltown Dam are notable examples of these types of efforts. The presence of predatory non-native fish, particularly lake trout, northern pike and walleye, is significant but a difficult threat to address. An on-going experimental lake trout removal effort in Swan Lake has been implemented to not only aid in the conservation of Swan drainage bull trout, but also to determine whether suppression of non-native species in certain locations can assist in bull trout recovery.

Angling and harvest is closely regulated to prevent additional stress on bull trout populations. Because of their opportunistic feeding habits and late maturity, bull trout are vulnerable to overharvest and poaching/accidental harvest, especially during spawning migrations and when in tributaries (Leathe and Enk 1985; Long 1997; Schmetterling and Long 1999; Carnefix 2002). Some Montana bull trout populations (e.g., Swan, South Fork Flathead, Kootenai, and Blackfoot rivers) responded well to more restrictive angling regulations or closures, and initial conservation efforts in Montana focused on such measures. Currently, intentional angling for bull trout is prohibited everywhere except in Hungry Horse and Lake Koocanusa reservoirs, Swan Lake, and the South Fork of the Flathead River upstream from Hungry Horse reservoir. Hungry Horse Reservoir is currently the only water in the state where a limited bull trout harvest is allowed. Some level of poaching (Swanberg 1996; Long 1997) and accidental harvest due to misidentification (Schmetterling and Long 1999) probably continues to impact some bull trout populations, but it is difficult to detect, quantify, prosecute, or prevent. Recent efforts to reduce misidentification include a bull trout identification and education webpage on the FWP website (http://fwp.mt.gov/education/angler/bullTroutIdProgram/).

Management of bull trout is guided by both state and federal documents. In 2000, a State of Montana sponsored effort with multiple stakeholders produced the planning document titled *Restoration Plan for Bull Trout in the Clark Fork River Basin and Kootenai River Basin in Montana* (Montana Bull Trout Restoration Team 2000). This plan sets goals, objectives and criteria for bull trout restoration, outlines actions to meet those criteria, and establishes a structure to monitor implementation and evaluate effectiveness of the plan. Local plans provide direct guidance for local bull trout conservation efforts and include such documents as *An Integrated Stream Restoration and Native Fish Conservation Strategy for the Blackfoot River Basin* (FWP 2005b), *Flathead Lake and River Co-Management Plan, 2001 – 2010* (FWP and Confederated Salish and Kootenai Tribes 2001), and the *Clark Fork River Native Salmonid Restoration Plan* (Clark Fork Relicensing Team Fisheries Working Group 1998). As a listed species, the USFWS is responsible for developing federal bull trout recovery plans and designation of "critical habitats." Although critical bull trout habitat in Montana was designated by the USFWS in 2010, the Federal bull trout recovery plan is still in a draft stage and has yet to be finalized (as of January 2014; USFWS 2002a).

All major river systems in western Montana (except the Yaak River) are designated by the USFWS as Critical Habitat for bull trout (USFWS 2002b). Critical Habitats are specific geographic areas that the USFWS considers essential for conservation and recovery of bull trout and may require special management and protection to meet recovery objectives. Non-native trout species that are popular sport fish can compromise bull trout use of these areas through predation, competition, and hybridization. The extent of these impacts varies by water and non-native species present. Historically bull trout have declined in number and distribution, with non-native trout often playing some role in the decline. However, recent management efforts have shown that the presence of non-native trout does not necessarily mean that bull trout populations will decline. Recent harvest restrictions and habitat improvements to enhance bull trout populations have resulted in some populations continuing to decline, some remaining stable (or ceasing the historical decline), and some increasing, all in the presence of non-native trout. Reasons for this variability may include interactions between the non-native trout and bull trout, as well as food web dynamics and habitat condition or type. Because non-native trout occupy portions of all of the drainages listed as Critical Habitat, a challenge for FWP is to continue to provide recreational fisheries for non-native trout while protecting and establishing viable populations of bull trout. Balancing the two is particularly challenging because bull trout populations typically require open systems for migration and this makes them more susceptible to the negative impacts associated with non-native trout.

Management of non-native species using liberalized harvest limits or active suppression is not viewed as a necessary or practical approach to bull trout management in all waters designated by the USFWS as Critical Habitat. Many river reaches identified as Critical Habitat currently support few if any bull trout, or are only seasonally utilized as migratory corridors. Such waters may have substantial habitat alterations that make them unsuitable for viable bull trout populations for the foreseeable future (e.g., Upper Clark Fork River above Flint Creek), or a mix of habitat changes and established non-native trout populations, which combined limit the likelihood that non-native species can be effectively managed to benefit bull trout (e.g., lower Bitterroot River). These river reaches may also support recreationally and economically important trout fisheries that are highly valued destinations for Montanans and out-of-state visitors. Though FWP will continue to evaluate the issue and possible solutions, implementing management techniques (i.e., passive or active suppression) with uncertain benefit to bull trout is unwarranted at this time.

Management Plans

Clark Fork Relicensing Team Fisheries Working Group. 1998. Clark Fork River Native Salmonid Restoration Plan. 63 pp.

Montana Bull Trout Restoration Team. 2000. Restoration plan for bull trout in the Clark Fork River basin and Kootenai River basin, Montana. Montana Department of Fish, Wildlife & Parks, Helena, Montana. 116 pp.

Montana Fish Wildlife and Parks. 2005. An Integrated Stream Restoration and Native Fish Conservation Strategy for the Blackfoot River Basin.

Montana Fish, Wildlife & Parks. 2013. Montana Statewide Fisheries Management Plan, 2013-2018. Montana Fish, Wildlife & Parks, Helena, Montana. 478 pp.

Montana Fish, Wildlife & Parks and Confederated Salish and Kootenai Tribes. 2000. Flathead Lake and River Fisheries Co-Management Plan, 2001 – 2010. 57 pp.

U.S. Fish and Wildlife Service. 2002. Endangered and Threatened Wildlife and Plants: Bull Trout *(Salvelinus confluentus)* Draft Recovery Plan. Available: http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=E065

U.S. Fish and Wildlife Service. 2010. Revised Designation of Critical Habitat for Bull Trout in the Coterminous United States; Final Rule. Federal Register / Vol. 75, No. 200 / Monday, October 18, 2010 / Rules and Regulations. Available at: http://www.fws.gov/pacific/bulltrout/CriticalHabitat.html

Bull Trout Current Impacts, Future Threats, and Conservation Actions

Current Impacts	**Future Threats**	**Conservation Actions**
Habitat degradation and loss due to incompatible land and water management practices	Habitat degradation and loss due to incompatible land and water management practices	Encourage and support opportunities such as land purchases or conservation easements to conserve upland areas adjacent to occupied bull trout waters Maintain adequate flows, cold thermal regime, high water quality, and connections between spawning and rearing habitat Restore degraded habitat and preserve existing healthy habitat Use USFWS bull trout critical habitat document to designate important bull trout areas
Introduction of non-native fishes resulting in competition, predation, and hybridization threats	Introduction of non-native fishes resulting in competition, predation, and hybridization threats	Increase management of non-native fishes Install barriers when necessary and manipulate fish populations to benefit bull trout when possible Prevent illegal introductions of fish species

Current Impacts	Future Threats	Conservation Actions
Loss of the migratory component of bull trout life history diversity by isolation and fragmentation of populations by both structural (e.g., dams) and environmental (e.g., thermal or pollution) barriers	Loss of the migratory component of bull trout life history diversity by isolation and fragmentation of populations by both structural (e.g., dams) and environmental (e.g., thermal or pollution) barriers	Reestablish connectivity between habitats isolated by constructed barriers Continue electrofishing surveys to monitor the status of bull trout and to determine whether mitigation measures implemented lead to improvements in this population
Ongoing poaching and accidental harvest due to misidentification	Ongoing poaching and accidental harvest due to misidentification	Educate anglers on bull trout identification and distribution Continue to enforce existing regulations
	Climate change altering habitat characteristics (e.g., air and water temperature, precipitation timing and amount)	Continue to evaluate current climate science models and recommended actions Maintain connectivity Monitor habitat changes and address climate impacts through adaptive management as necessary Routinely monitor known populations

Columbia River Redband Trout (*Oncorhynchus mykiss gairdneri*) State Rank: S1

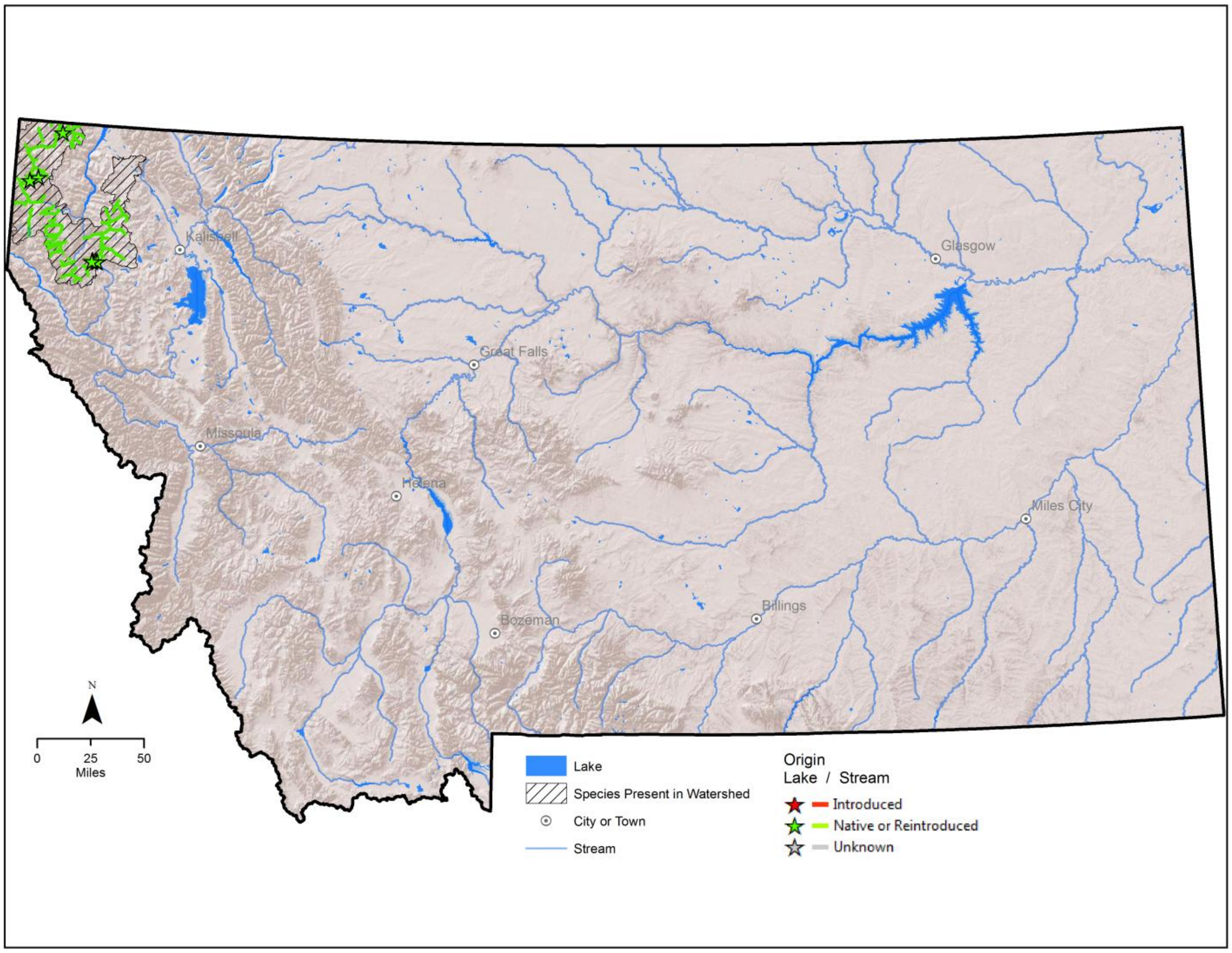

Figure 82. Distribution of Columbia River redband trout

Habitat

The seasonal habitat requirements of redband trout in the Kootenai River drainage in Montana were investigated during 1997 and 1998 (Hensler and Muhlfeld 1999; Muhlfeld 1999; Muhlfeld et al. 2001). Summer results demonstrated that juvenile and adult redband trout prefer deep microhabitats (>1.3 feet) with low to moderate velocities (<1.6 feet/second) adjacent to the thalweg. Conversely, age-0 redband trout select slow water (less than 0.3 feet/second) and shallow depths (<0.7 feet) located in lateral areas of the channel. All ages of redband trout strongly selected pools and avoided riffles; runs were used generally as expected (based on availability) by juveniles and adults and more than expected by age-0 redband trout. At the macrohabitat scale, a multiple regression model indicated that low-gradient, mid-elevation reaches with an abundance of complex pools are critical areas for the production of redband trout. Mean reach densities ranged from 0.008-0.08 fish/yd^2. During the fall and winter period, adult redband trout occupied small home ranges and found suitable overwintering habitat in deep pools with extensive amounts of cover in headwater streams. In Basin Creek, adult redband trout commenced spawning (e.g., redd construction) during June as spring flows subsided following peak runoff. Redband trout generally selected redd sites in shallow pool tail-out areas (mean depth = 0.9 feet; range: 0.7-1.5) with moderate water velocities (mean velocity = 1.6 feet/second; range: 0.8-2.3 feet/second) dominated by gravel substrate.

Management
FWP and land managers (state, federal, and private) are integral partners in the management of redband trout. Current management efforts include assessing and monitoring remaining populations; protecting important habitats; and developing long-term conservation strategies that may include removal of non-native trout and placement of barriers to prevent their return; and reintroduction of redband trout to streams where they have been lost. In addition, since 2002 FWP has been developing and testing a redband trout broodstock at FWP's Libby Isolation Facility and Murray Springs State Fish Hatchery. Established from a wild redband population, this brood is being developed to replace stocking for recreational purposes, of hatchery coastal rainbow trout or WCT, in drainages where redband trout are native. The effort will reduce the likelihood of additional hybridization of the species.

In the near term, the management direction for redband trout includes maintaining the existing distribution and genetic diversity of remaining populations, and developing conservation plans and projects that ensure long-term, self-sustaining persistence of the subspecies in Montana. Though recreational angling opportunities for the redband trout are currently limited outside of small streams, the development of a redband trout brood stock should provide future opportunities to establish recreational fisheries in closed-basin lakes in the Kootenai drainage. Likewise, efforts to secure and expand the distribution of existing populations and reintroduce them into streams where they have been lost will result in additional opportunities to pursue this unique native sport fish.

Management Plan
Montana Fish, Wildlife & Parks. 2013. Montana Statewide Fisheries Management Plan, 2013-2018. Montana Fish, Wildlife & Parks, Helena, Montana. 478 pp.

Columbia River Redband Trout Current Impacts, Future Threats, and Conservation Actions

Current Impacts	**Future Threats**	**Conservation Actions**
Culverts, dams, irrigation diversions, and other instream barriers that fully or partially impede movement and reduce connectivity of habitat	Culverts, dams, irrigation diversions, and other instream barriers that fully or partially impede movement and reduce connectivity of habitat	Remove or modify barriers to restore beneficial fish passage Support habitat restoration projects similar to those implemented by the Libby Dam Mitigation Project (Holderman et al., unknown year)
Habitat degradation and fragmentation due to development	Habitat degradation and fragmentation due to development	Encourage and support opportunities such as land purchases or conservation easements to conserve upland areas adjacent to occupied Columbia River redband trout waters

Current Impacts	Future Threats	Conservation Actions
Hybridization	Hybridization	Protect genetic composition by raising hatchery Columbia River redband trout Reduce stocking of non-native trout in sensitive areas Where appropriate and feasible, remove hybridized or competing populations of introduced species
Geographically restricted range	Geographically restricted range	Consider and investigate reintroduction efforts Consider preparing a management plan for the Columbia River redband trout or include it in other comprehensive taxonomic plans Identify specific areas where redband trout have been extirpated or severely reduced and work toward reestablishing populations Survey and assess areas where reintroduction efforts could occur
Incompatible range and forest management practices, including pesticide use	Incompatible range and forest management practices, including pesticide use	Encourage use BMPs for forest management activities to maintain diverse and resilient habitats within current range of redband trout Ensure species' requirements are included in forest plans Reduce stream intake of pesticides and herbicides Work with landowners and land management agencies to limit activities that may be detrimental to this species

Current Impacts	Future Threats	Conservation Actions
	Climate change altering habitat characteristics (e.g., air and water temperature, precipitation timing and amount)	Continue to evaluate current climate science models and recommended actions Maintain connectivity Monitor habitat changes and address climate impacts through adaptive management as necessary Routinely monitor known populations

Lake Trout (*Salvelinus namaycush*)* State Rank: S2

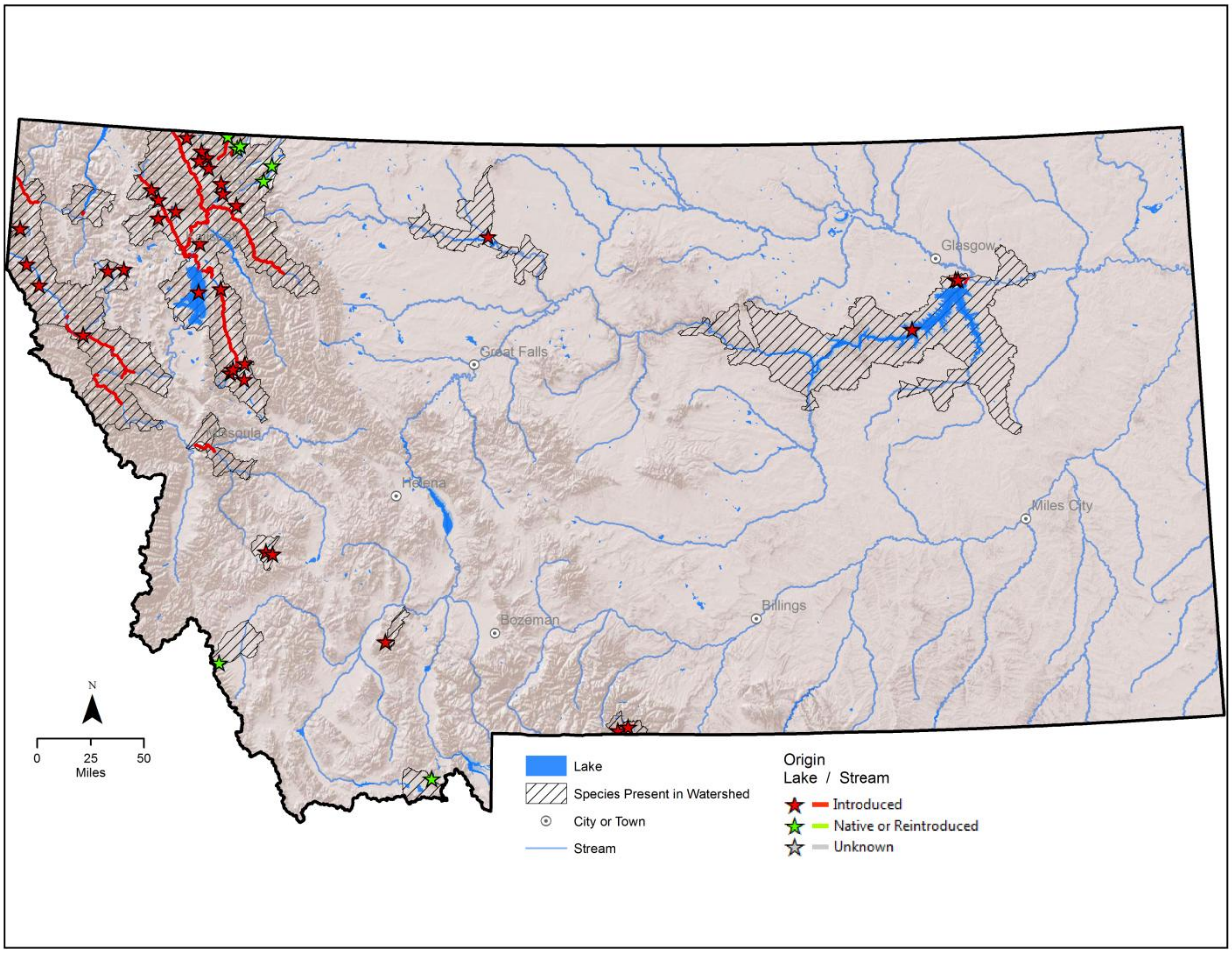

Figure 83. Distribution of lake trout

Habitat

While lake trout can be found in cold rivers and shallow lakes in the northern portion of its range (Scott and Crossman 1973) in Montana, native lake trout only inhabit a few deep, cold lakes remaining from the Pleistocene glaciations. Montana's native lake trout populations remain in Waterton Lake, Glenns Lake, Cosley Lake, and St. Mary Lake in Glacier National Park, and Lower St. Mary Lake in the Blackfeet Indian Reservation. All of these waters are in drainages that eventually reach the Hudson Bay. Other native populations occur in Twin Lake in the Big Hole River drainage and Elk Lake in the Red Rock River drainage, both tributaries to the upper Missouri River drainage.

Lake trout prefer water temperatures in the 50- to 57-degree F range and, therefore, spend most of their lives in deeper, benthic habitats. Lake trout can occasionally be found in shallow water habitats, usually immediately after ice-out when surface waters are within their preferred temperature range. They spawn in the fall on the rocky substrate of the shoreline. Lake trout scatter or broadcast their spawn, a rarity in the trout group.

Management
Management recommendations within this document pertain only to the Elk Lake and Twin Lake populations. Though additional information is necessary to better describe and monitor the status Montana's native lake trout populations, the Elk Lake population is believed to be relatively secure and stable. Recent data from the Twin Lakes population indicate the population is small and suffers from sporadic recruitment. It appears that spawning habitat in the lake is limited, and while fish are long-lived in the lake, they only successfully spawn periodically. It is possible that alterations to the outlet of the lake have contributed to the decline in available spawning habitat. Future projects are needed at Twin Lakes to improve spawning habitat and increase the frequency of successful spawning to stabilize the population and ensure its long-term persistence. The populations in Waterton, Cosley, Glenns, and St. Mary lakes are afforded the protection of their location within Glacier National Park. The Waterton population is believed to be abundant and stable.

Management Plan
Montana Fish, Wildlife & Parks. 2013. Montana Statewide Fisheries Management Plan, 2013-2018. Montana Fish, Wildlife & Parks, Helena, Montana. 478 pp.

Lake Trout Current Impacts, Future Threats, and Conservation Actions

Current Impacts	**Future Threats**	**Conservation Actions**
Genetic bottlenecks caused by small size of remaining populations	Genetic bottlenecks caused by small size of remaining populations	Reintroduce genetically pure native populations
Irregular recruitment	Irregular recruitment	Increase monitoring and surveying
Limiting factors unknown	Limiting factors unknown	Identify and remedy limiting factors
Little information on native populations	Little information on native populations	Consider preparing a management plan for the lake trout (native lakes) or include it in other comprehensive taxonomic plans
	Climate change altering habitat characteristics (e.g., air and water temperature, precipitation timing and amount)	Continue to evaluate current climate science models and recommended actions Monitor habitat changes and address climate impacts through adaptive management as necessary Routinely monitor known populations

*Only native or reintroduced populations will be addressed.

Westslope Cutthroat Trout (*Oncorhynchus clarkii lewisi*)* State Rank: S2

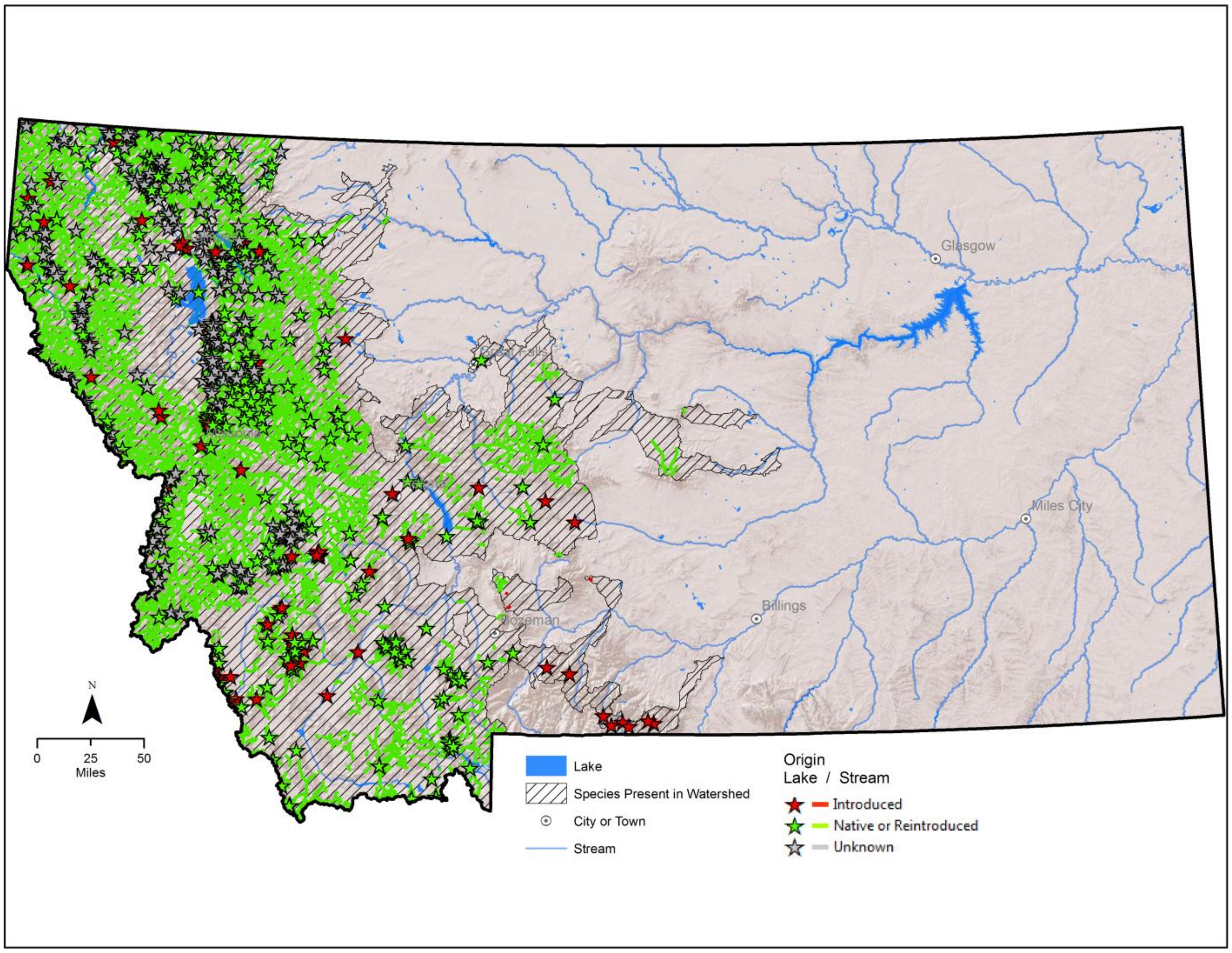

Figure 84. Distribution of westslope cutthroat trout

Habitat

WCT spawning and rearing streams tend to be cold and nutrient poor. This species seeks out gravel substrate in riffles and pool crests for spawning habitat. WCT have long been regarded as sensitive to fine sediment, generally defined as 0.25 inches or less. Although studies have documented negative survival as fine sediment increases (Weaver and Fraley 1991), it is difficult to predict their response in the wild (McIntyre and Rieman 1995). This is due to the complexity of stream environments and the ability of fish to somewhat adapt to microhabitat changes (Everest et al. 1987; AFS website 2013).

WCT require cold water, although it has proven elusive to define exact temperature requirements or tolerances. Likewise, cutthroat trout tend to thrive in streams with more pool habitat and cover than uniform, simple habitat (Shepard et al. 1984). Juvenile WCT overwinter in the interstitial spaces of large stream substrates. Adult WCT need deep, slow-moving pools that do not fill with anchor ice in order to survive the winter (Brown and Mackay 1995; AFS website 2013).

Management

While WCT remain common in many waters west of the continental divide and have been stocked in numerous lakes and reservoirs, their distribution and abundance has declined in many portions of their historic range. Major factors contributing to their decline include competition with non-native species of trout (e.g., brook, brown and rainbow trout), hybridization with rainbow trout, stocking outside their historic range, habitat changes, and migratory barriers. In Montana it is currently estimated that genetically pure WCT occupy about 20% (5,950 miles) of their historic range. Slightly hybridized populations, <10% level of hybridization, are also managed for their conservation value and when combined with genetically pure population, the current distribution of WCT increases to 30% (8,830 miles) their historic range.

The status of WCT throughout its distribution in Montana is quite variable. Non-hybridized WCT populations on the west side of the continental divide are more widely distributed and represent the majority of the occupation percentage listed above. Non-hybridized WCT populations in the Upper Missouri River Basin presently only occupy 4% of their historic distribution, and are commonly limited to small headwater streams. As a SGCN and sport fish, WCT receive considerable management attention and resources from FWP, federal land management agencies, and private organizations.

In most cases WCT populations residing in rivers and streams have been identified as "conservation populations," which indicates the need to manage the population for natural, self-sustaining persistence. Streams and rivers are not stocked with hatchery WCT, with the exception being restoration efforts where cutthroat brood or wild eggs are introduced in smaller streams to reestablish populations. Stream and river creel regulations vary based on strength of populations, with "catch and release" or limited harvest; size limit is the most common type of regulation.

Management concerns for WCT vary by drainage and region of the state. Efforts to address threats are often developed specific to an individual body of water. In some waters, angler harvest limits and habitat protection are suitable management measures to ensure robust WCT populations remain. In all locations, biologists are actively monitoring and maintaining or improving habitat conditions necessary for robust cutthroat populations. Such efforts may include addressing concerns related to riparian condition, passage concerns at road crossings, entrainment in irrigation systems, and in-stream flow. In some drainages, non-native trout species are removed to reduce threats to "at-risk" WCT populations, or to develop areas for cutthroat restoration. Barriers to upstream fish passage are often constructed at the lower end of these recovery areas to prevent re-invasion of non-native species. Projects to reestablish WCT populations for conservation purposes are common in the upper Missouri and Yellowstone drainages, and these efforts often include transferring eggs or live fish from existing threatened populations to preserve their genetic legacy.

Management of Montana's WCT is directed by regional and statewide management plans. The 2007 document titled *Memorandum and Conservation Agreement for Westslope Cutthroat Trout and Yellowstone Cutthroat Trout in Montana* (FWP 2007) is the principal document that sets objectives and goals for overall cutthroat conservation in Montana, and has been signed by numerous state, federal, tribal, and private stakeholders.

Management Plans
Montana Fish, Wildlife & Parks. 2007. Memorandum of Understanding and Conservation Agreement for Westslope Cutthroat and Yellowstone Cutthroat Trout in Montana. 37 pp.

Montana Fish, Wildlife & Parks. 2013. Montana Statewide Fisheries Management Plan, 2013-2018. Montana Fish, Wildlife & Parks, Helena, Montana. 478 pp.

Shepard, B. B., B. E. May, W. Urie. 2003. Status of westslope cutthroat trout (*Onchorhyncus clarkii lewisi*) in the United States, 2002. Westslope Cutthroat Conservation Team.

Westslope Cutthroat Trout Current Impacts, Future Threats, and Conservation Actions

Current Impacts	**Future Threats**	**Conservation Actions**
Climate change altering habitat characteristics (e.g., air and water temperature, precipitation timing and amount)	Climate change altering habitat characteristics (e.g., air and water temperature, precipitation timing and amount)	Continue to evaluate current climate science models and recommended actions Restore habitat Enhance or restore vegetation along streams to increase shade Limit cattle access along streams where they may be reducing vegetation and shade Maintain connectivity Monitor habitat changes and address climate impacts through adaptive management as necessary Restore proper width:depth ratio to maintain favorable water temperature and flow regimes Routinely monitor known populations
Fish spawning habitat loss due to dewatering of streams for irrigation and because of barriers created by dams and road culverts	Fish spawning habitat loss due to dewatering of streams for irrigation and because of barriers created by dams and road culverts	Remove barriers and improve fish passage Work with landowners and land management agencies to limit activities that may be detrimental to this species

Current Impacts	Future Threats	Conservation Actions
Habitat loss due to incompatible range, forest, mining, or agricultural management practices; residential development; and the impact of roads	Habitat loss due to incompatible range, forest, mining, or agricultural management practices; residential development; and the impact of roads	Encourage and support opportunities such as land purchases or conservation easements to conserve upland areas adjacent to occupied waters Ensure that species' requirements are included in forest plans Conduct habitat restoration and enhancement Review subdivision requests and make recommendations based on FWP's *Fish and Wildlife Recommendations for Subdivision Development* (FWP 2012a) to reduce negative effects on SGCN and their habitats Work with landowners and land management agencies to limit activities that may be detrimental to this species
Competition and predation by non-native species	Competition and predation by non-native species	Increase limits of non-native fish Install barriers when necessary and manipulate fish populations to benefit WCT when possible Remove non-native fish where appropriate and possible
Increased hybridization with other species	Increased hybridization with other species	Assess genetic status of conservation populations Continue to conserve genetically pure populations Install barriers to protect remaining populations Protect integrity of pure WCT isolates Restore pure WCT where applicable
Isolated and small population sizes	Isolated and small population sizes	Continue to monitor WCT for trend Continue to monitor WCT populations and adjust stocking when necessary

Current Impacts	**Future Threats**	**Conservation Actions**
		Continue to use the *WCT Memorandum of Understanding* (Montana Cutthroat Trout Steering Committee 2007) to identify and protect conservation areas Identify specific areas where WCT have been extirpated or severely reduced and work toward reestablishment of populations Increase stock populations of genetically pure WCT Reintroduce WCT
Overfishing (mainly migratory populations west of the Continental Divide)	Overfishing	Continue to closely manage WCT harvest Educate anglers on WCT identification and distribution

*Only native or reintroduced populations will be addressed.

Yellowstone Cutthroat Trout (*Oncorhynchus clarkii bouvieri*)* State Rank: S2

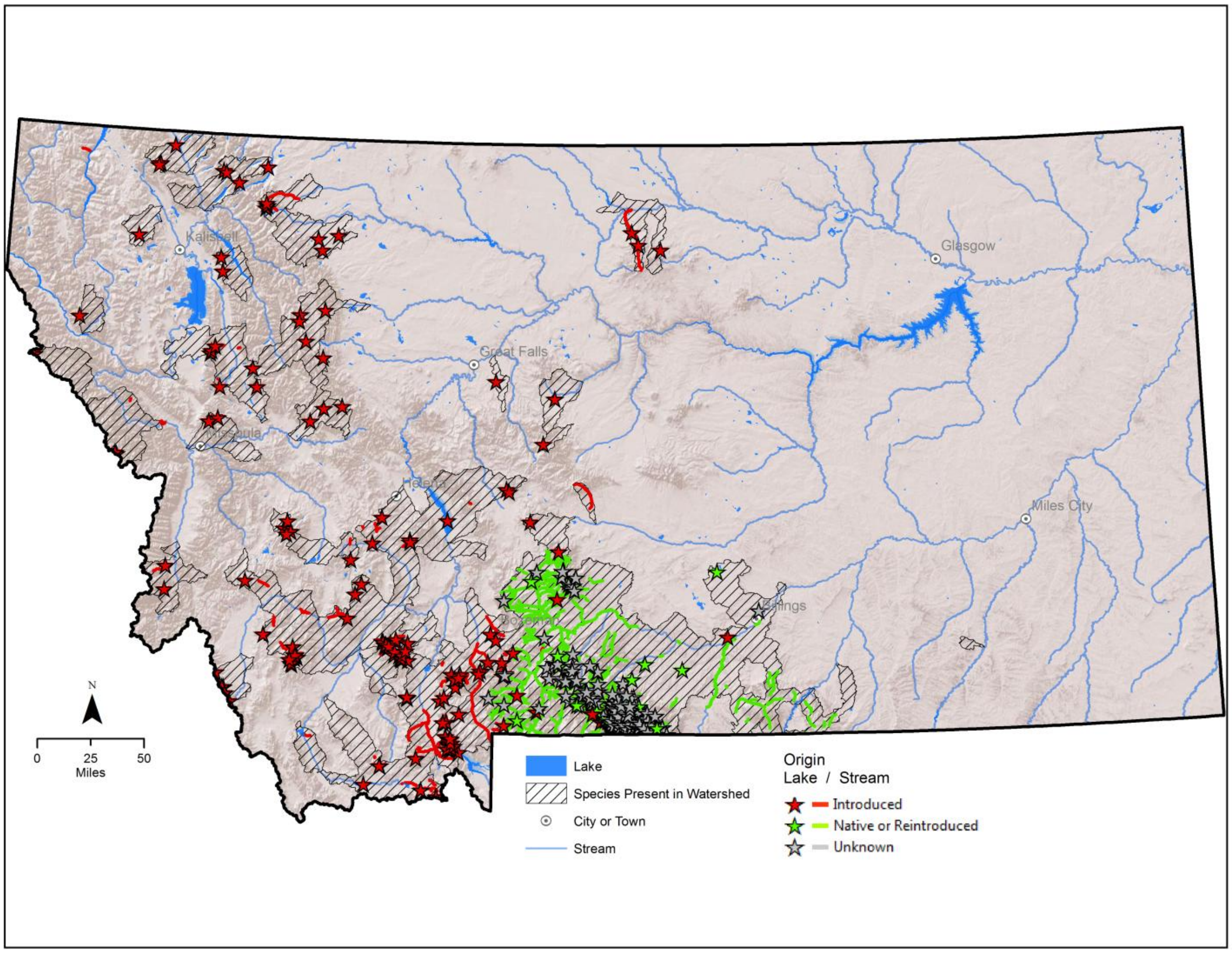

Figure 85. Distribution of Yellowstone cutthroat trout

Habitat

YCT inhabit relatively clear, cold streams, rivers, and lakes. Optimal temperatures have been reported to be from 39 to 59 degrees F., with occupied waters ranging from 32 to 81 degrees F (Gresswell 1995; AFS website 2013).

Management

As a SGCN and sport fish, YCT receive considerable management attention and resources from FWP, federal land management agencies, and private organizations. While YCT remain common in many waters west of the continental divide and have been stocked in numerous lakes and reservoirs, their distribution and abundance has declined in many portions of their historic range. Major factors contributing to the sub-species decline include competition with non-native species of trout (e.g., brook, brown, and rainbow trout), hybridization with rainbow trout, stocking outside their historic range, habitat changes, and migratory barriers. In Montana it is currently estimated that genetically pure YCT occupy about 16% (705 miles) of their historic range. Slightly hybridized populations, <10% level of hybridization, are also managed for their conservation value. When combined with genetically pure populations, the current distribution of YCT increases to 28% (1,210 miles) of their historic range.

YCT status and distribution varies spatially. Some areas exist where YCT have been isolated from non-native fishes, but many of the existing YCT populations overlap with non-native species and are therefore not secure. Non-hybridized YCT populations in the Upper Yellowstone River Basin presently occupy 26% of their historic distribution.

In most cases YCT populations residing in rivers and streams have been identified as "conservation populations," which indicates the need to manage the population for natural, self-sustaining persistence. Streams and rivers are not stocked with hatchery YCT, with the exception being restoration efforts where cutthroat brood or wild eggs are introduced in smaller streams to reestablish populations. Stream and river creel regulations vary based on strength of populations, with "catch and release" or limited harvest; size limit is the most common type of regulation.

Management concerns for YCT vary by drainage and region of the state. Efforts to address threats are often developed specific to an individual body of water. In some waters, angler harvest limits and habitat protection are suitable management measures to ensure that robust YCT populations remain. In all locations, biologists are actively monitoring and maintaining or improving habitat conditions necessary for robust cutthroat populations. Such efforts may include addressing concerns related to riparian condition, passage concerns at road crossings, entrainment in irrigation systems, and in-stream flow. In some drainages, non-native trout species are removed to reduce threats to "at-risk" populations, or to develop areas for cutthroat restoration. Barriers to upstream fish passage are often constructed at the lower end of these recovery areas to prevent reinvasion of non-native species. Projects to reestablish YCT populations for conservation purposes are common in the upper Missouri and Yellowstone drainages, and these efforts often include transferring eggs or live fish from existing threatened populations to preserve their genetic legacy.

Management of YCT is directed by regional and statewide management plans. The 2007 document titled *Memorandum and Conservation Agreement for Westslope Cutthroat Trout and Yellowstone Cutthroat Trout in Montana* (FWP 2007) is the principal document that sets objectives and goals for overall cutthroat conservation in Montana, and has been signed by numerous state, federal, tribal, and private stakeholders.

<u>Management Plans</u>

Endicott, C., S. Opitz, B. Shepard, P. Byorth, S. Shuler, S. Barndt, B. Roberts, and L. Roulson. 2012. Yellowstone cutthroat trout conservation strategy for the Shields River watershed above Chadbourne Diversion. 141 pp. http://fwp.mt.gov/fishAndWildlife/management/yellowstoneCT/

Montana Fish, Wildlife & Parks. 2000. Cooperative Conservation Agreement for Yellowstone Cutthroat Trout within Montana between Crow Tribe, Montana Department of Fish, Wildlife & Parks, Montana Department of Environmental Quality, Montana Department of Natural Resources and Conservation, USDA Forest Service–Northern Region, Gallatin and Custer national forests, Bureau of Land Management–Montana, U.S. Fish and Wildlife Service, Bureau of Indian Affairs, Yellowstone National Park.

Montana Fish, Wildlife & Parks. 2007. Memorandum of Understanding and Conservation Agreement for Westslope Cutthroat and Yellowstone Cutthroat Trout in Montana. 37 pp.

Montana Fish, Wildlife & Parks. 2013. Montana Statewide Fisheries Management Plan, 2013-2018. Montana Fish, Wildlife & Parks, Helena, Montana. 478 pp.

Montana Fish, Wildlife & Parks. 2013. Yellowstone Cutthroat Trout Conservation Strategy for Montana. http://fwp.mt.gov/fishAndWildlife/management/yellowstoneCT/

Range-Wide Yellowstone Cutthroat Trout Conservation Team. 2009. Conservation Strategy for Yellowstone Cutthroat Trout (*Oncorhynchus clarkii bouvieri*) in the States of Idaho, Montana, Nevada, Utah and Wyoming. Montana Fish, Wildlife and Parks, Helena.

Yellowstone Cutthroat Trout Working Group. 1994. Yellowstone cutthroat trout (*Oncorhynchus clarkii bouvieri*) management guide for the Yellowstone River drainage. Montana Department of Fish, Wildlife & Parks, Helena, Montana, and Wyoming Game and Fish Department, Cheyenne, Wyoming.

Yellowstone Cutthroat Trout Current Impacts, Future Threats, and Conservation Actions

Current Impacts	**Future Threats**	**Conservation Actions**
Climate change altering habitat characteristics (e.g., air and water temperature, precipitation timing and amount)	Climate change altering habitat characteristics (e.g., air and water temperature, precipitation timing and amount)	Continue to evaluate current climate science models and recommended actions Monitor habitat changes and address climate impacts through adaptive management as necessary Restore habitat Maintain connectivity Routinely monitor known populations
Culverts, dams, irrigation diversions, and other instream barriers that fully or partially impede fish movement and reduce connectivity of habitat	Culverts, dams, irrigation diversions, and other instream barriers that fully or partially impede fish movement and reduce connectivity of habitat	Remove or modify barriers to restore beneficial fish passage
Habitat degradation	Habitat degradation	Restore or enhance habitat
Persistence of non-native fish	Persistence of non-native fish	Continue harvest management of non-native trout Reduce or eliminate stocking of non-native fish

Current Impacts	**Future Threats**	**Conservation Actions**
Incompatible range, forest, development, or mining management practices	Incompatible range, forest, development, or mining management practices	Encourage and support opportunities such as land purchases or conservation easements to conserve upland areas adjacent to occupied waters Ensure that species requirements are included in forest plans Restore and enhance habitat Review subdivision requests and make recommendations based on FWP's *Fish and Wildlife Recommendations for Subdivision Development* (FWP 2012a) to reduce the negative effects on SGCN and their habitats Work with landowners and land management agencies to limit activities that may be detrimental to this species
River channelization or rip-rap	River channelization or rip-rap	Work with new stabilization projects to reduce impacts and support efforts to restore existing rip-rap areas to natural condition
Susceptibility to infection by *Myxobolus cerebralis*, a European protozoan and the causative agent of whirling disease	Susceptibility to infection by *Myxobolus cerebralis*, a European protozoan and the causative agent of whirling disease	Work with partners to provide or obtain funding to study whirling disease
Tributary dewatering by unsustainable irrigation practices	Tributary dewatering by unsustainable irrigation practices	Work with landowners and land management agencies to limit activities that may be detrimental to this species

Current Impacts	Future Threats	Conservation Actions
Widespread stocking of non-indigenous populations of YCT	Widespread stocking of non-indigenous populations of YCT	Decrease stocking of non-indigenous YCT to decrease genetic homogenization Decrease stocking of non-native trout Follow recommendations in the *Yellowstone Cutthroat Trout Conservation Strategy for Montana* (FWP 2013b), specifically for monitoring for genetic diversity and population change (pages 183-184)

*Only native or reintroduced populations will be addressed.

<u>Trout-perch</u> (*Percopsis omiscomaycus*) State Rank: S2
Species of Greatest Inventory Need

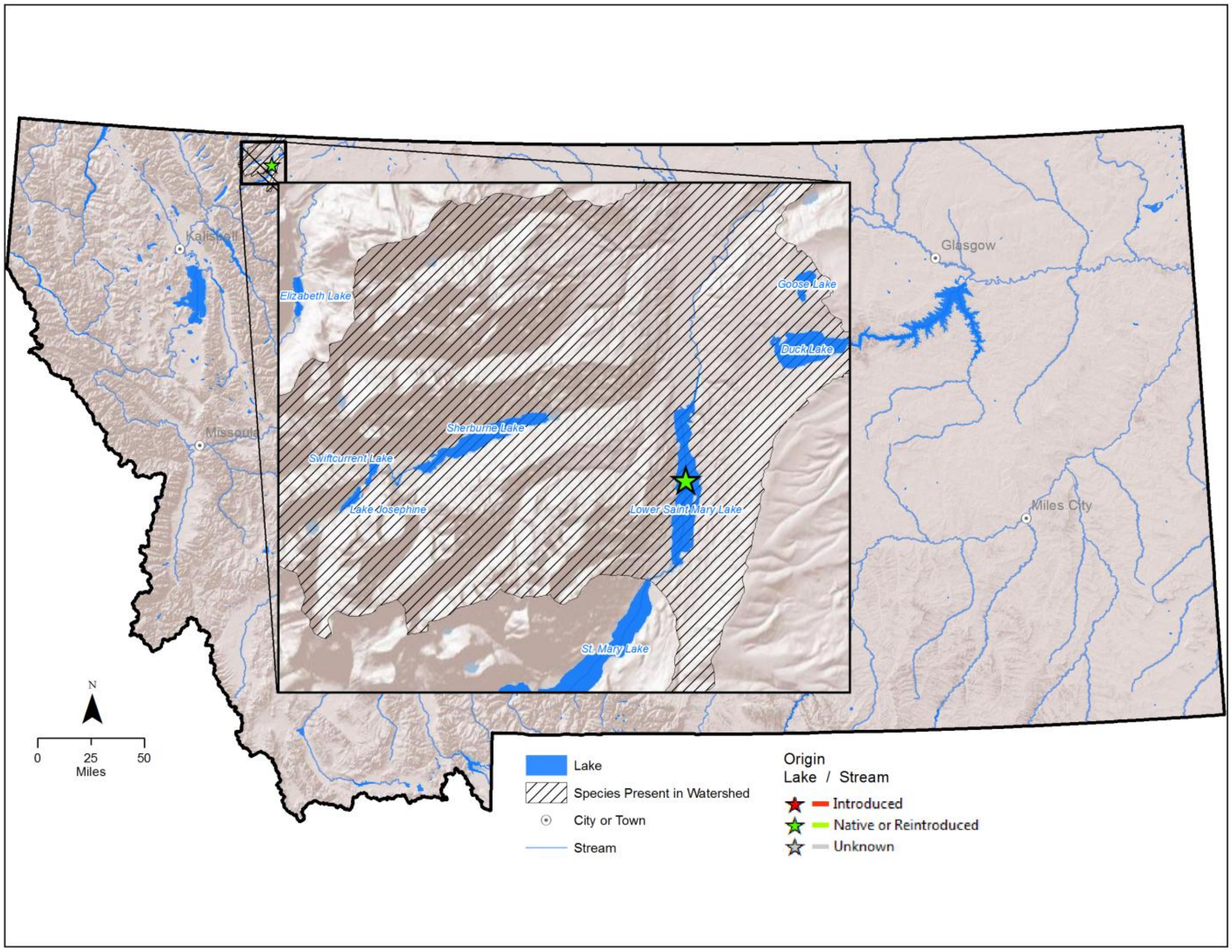

Figure 86. Distribution of the trout-perch

<u>Habitat</u>
Trout-perch preferred habitat is found along the shoals of lakes or in deeper pools of streams where the bottom is clean sand, gravel, or rubble. They spawn over sand or gravel in three to four feet of water. In Lower Saint Mary Lake, they are associated with large rocky cover, and have not been captured over sandy or silty substrates. During daylight periods, they appear to use rocks as hiding cover, while at night they are out of, but in close proximity to, rocky cover. In the Saint Mary Canal, trout-perch have been captured in winter after the canal head gate is closed. In the canal, trout-perch are found in residual pools, associated with large, rocky cover or concrete riprap (R. Wagner, USFWS, personal communication, October 2000; AFS website 2013).

<u>Management</u>
FWP classifies trout-perch as a nongame wildlife species and they are too small to be sought by anglers. The entire known range of trout-perch in Montana is within Glacier National Park and the Blackfeet Indian Reservation. Neither entity has a specific management program for trout-perch.

Management Plan
Montana Fish, Wildlife & Parks. 2013. Montana Statewide Fisheries Management Plan, 2013-2018. Montana Fish, Wildlife & Parks, Helena, Montana. 478 pp.

Trout-perch Current Impacts, Future Threats, and Conservation Actions

Current Impacts	**Future Threats**	**Conservation Actions**
Data poor Lacks baseline survey		Survey the Belly River and Waterton Lake in Montana to establish the presence of trout-perch in these waters Target species for survey and inventory
Impoundments restricting proper movement of populations	Impoundments restricting proper movement of populations	Manage irrigation and development to improve connectivity of habitat
Sensitive to pollution and sedimentation associated with row crop agriculture as well as channelization	Sensitive to pollution and sedimentation associated with row crop agriculture as well as channelization	Conserve riparian areas, including increasing restrictions on fertilizer and nutrient seepage into waters Work with landowners and land management agencies to limit activities that may be detrimental to this species
Sensitive to warm water temperatures	Sensitive to warm water temperatures	Appropriate conservation action(s) unknown
	Climate change altering habitat characteristics (e.g., air and water temperature, precipitation timing and amount)	Continue to evaluate current climate science models and recommended actions Maintain connectivity Monitor habitat changes and address climate impacts through adaptive management as necessary Routinely monitor known populations

Mammals

Grizzly Bear (*Ursus arctos*) State Rank: S2S3

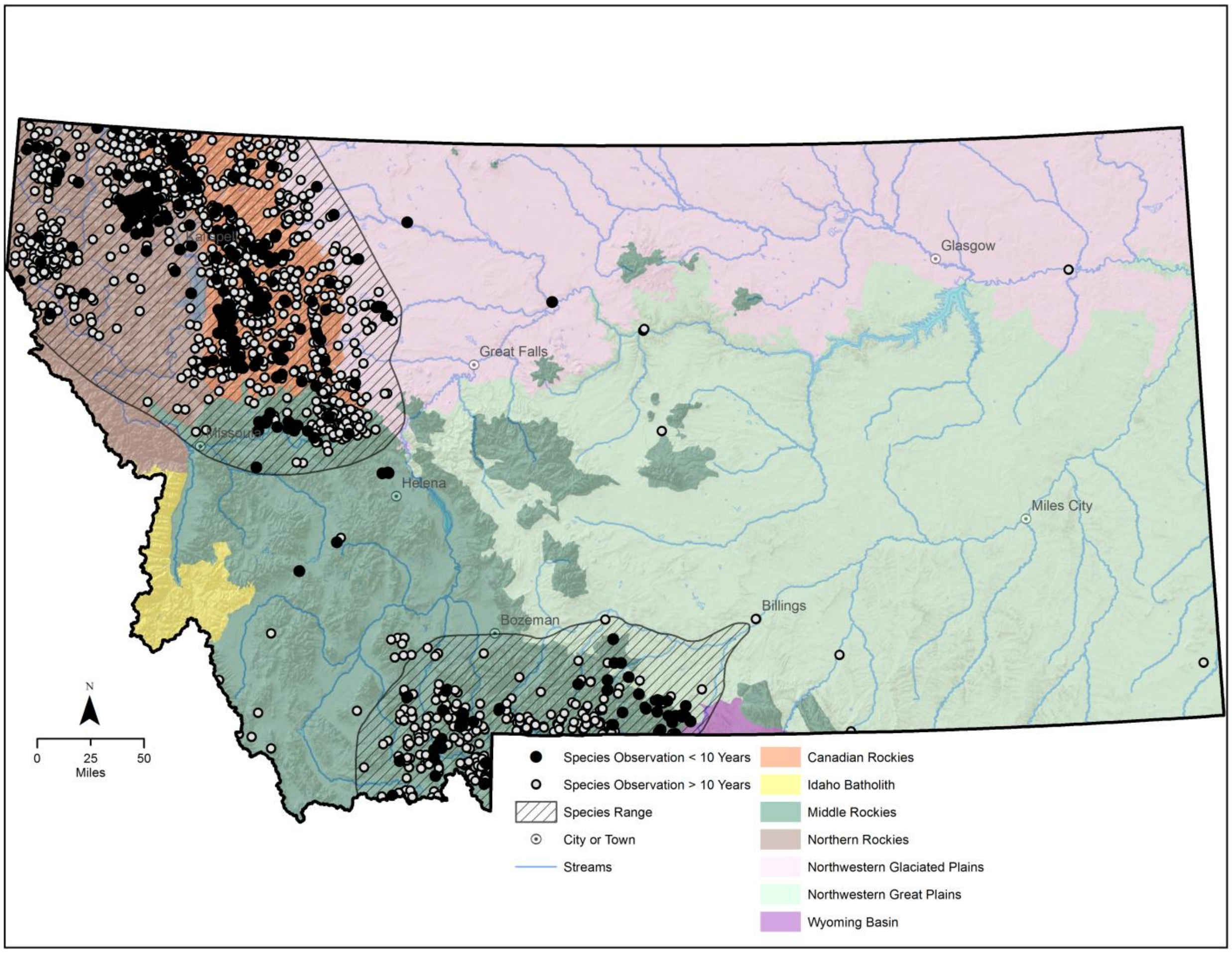

Figure 87. Montana range and observations of the grizzly bear

Habitat

In Montana, grizzlies primarily use meadows, seeps, riparian zones, mixed shrub fields, closed timber, open timber, side-hill parks, snow chutes, and alpine slabrock habitats. Habitat use is highly variable between areas, seasons, local populations, and individuals (Servheen 1983; Craighead et al. 1982; Aune et al. 1984). Historically, grizzly bears occupied a much broader range into eastern Montana.

Management

On July 28th, 1975, the grizzly bear was designated as threatened in lower 48 states under the ESA. Currently, populations in the Cabinet/Yaak, Northern Continental Divide, and Greater Yellowstone recovery areas are listed as threatened. The Bitterroot Recovery Zone in the Bitterroot Mountains of Montana and Idaho was designated in anticipation of reintroduction of grizzly bears where they would be classified as experimental nonessential. This reintroduction never took place, but in 2007 a naturally colonizing grizzly bear was killed in the Idaho portion of this recovery area.

In 2007, USFWS announced that the Yellowstone Distinct Population Segment of grizzly bears was a recovered population no longer meeting the ESA's definition of threatened (Federal Register 2007). In 2009 the Yellowstone Distinct Population Segment was relisted as threatened as a result of a U.S. District ruling that stated declines in whitebark pine and inadequate conservation plans still threaten the species. This ruling has been upheld by the U.S. 9th Circuit Court of Appeals. USFWS completed a five-year review of the status of grizzly bears in August of 2011. There are numerous policies, e.g., MCA 12.9.103 that outline guidelines for FWP to promote the conservation and responsive management of grizzly bears in Montana. Regional specific management plans include the *Grizzly Bear Management Plan for Southwestern Montana* (FWP 2002; 2013), the *Grizzly Bear Management Plan for Western Montana* (Dood et al. 2006), and conservation strategies for the Yellowstone and Northern Continental Divide Ecosystem grizzly bear populations, along with various tribal, National Forest, and National Park plans and policies. Most of these management plans are centered on three major themes: management of habitat to ensure grizzly bears have large expanses of suitable interconnected lands in which to exist, management of grizzly bear/human interactions that can result in death of the bears involved, and monitoring to determine population size and trends. Consult the management plans listed below for specifics on grizzly bear management.

<u>Management Plans</u>

Dood, A. R., S. J. Atkinson, and V. J. Boccadori. 2006. Grizzly Bear Management Plan for Western Montana: final programmatic environmental impact statement 2006-2016. Montana Department of Fish, Wildlife and Parks, Helena, Montana. 163 pp.

Interagency Conservation Strategy Team. 2007. Final Conservation Strategy for the Grizzly Bear in the Greater Yellowstone Area. 86 pp.

Interagency Conservation Strategy Team. *In prep*. Final Conservation Strategy for the Grizzly Bear in the Northern Continental Divide Ecosystem.

Montana Fish, Wildlife & Parks. 2001. Conservation Plan for Grizzly Bears in Montana. Pursuant to Section 6(C)(1) of the Endangered Species Act and Montana Fish, Wildlife & Parks Endangered Wildlife Program E-6. Helena, Montana.

Montana Fish, Wildlife & Parks. 2013. Grizzly Bear Management Plan for Southwestern Montana 2013.

Servheen, C. 1993. Grizzly bear recovery plan. Unpublished report to the U.S. Fish and Wildlife Service. University of Montana, Missoula, Montana. 181 pp.

Shaffer, M. 1992. Keeping the grizzly bear in the American West: an alternative recovery plan. The Wilderness Society, Washington, DC.

U.S. Fish and Wildlife Service. 1982. Grizzly bear recovery plan. Unpublished report prepared in cooperation with recovery team leader Don L. Brown of the Montana Department of Fish, Wildlife & Parks. 195 pp.

Grizzly Bear Current Impacts, Future Threats, and Conservation Actions

Current Impacts	Future Threats	Conservation Actions
Genetic fragmentation among Montana populations Loss of connectivity	Genetic fragmentation among Montana populations Loss of connectivity	Continue/support ongoing research projects, including genetic analysis projects Maintain opportunity for connectivity among and between populations
Habitat loss, degradation, and fragmentation	Habitat loss, degradation, and fragmentation	Encourage and support opportunities such as land purchases or conservation easements to protect important grizzly habitats Keep road density at or below current levels to meet management goals outlined for grizzly recovery in western and southwest Montana Implement and follow state management plans and conservation strategies
Human-bear and bear-livestock interactions	Human-bear and bear-livestock interactions	Continue and expand "living with bears" educational efforts in areas currently occupied or likely to be reoccupied by grizzly bears Continue interagency management efforts Identify if recreational use needs to be managed in some areas to reduce conflicts with grizzly bears Conduct proactive management including public outreach, utilizing Montana citizens Reduce human-caused mortality, including vehicle and train caused mortalities

Bison (*Bos bison*) State Rank: S2

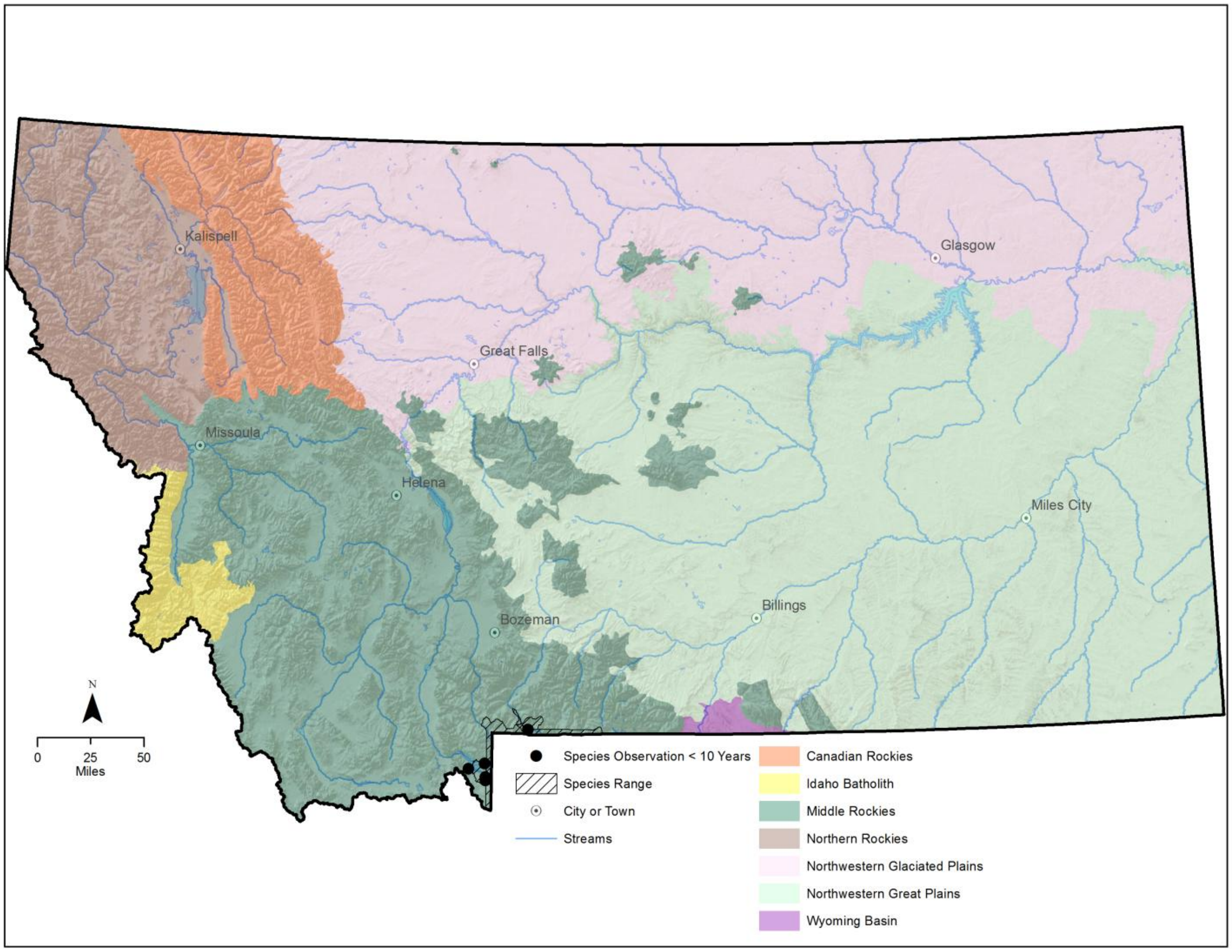

Figure 88. Montana range and observations of bison classified as "game animal" and/or "species in need of disease control"

Habitat

Because of restrictions, currently occupied habitat does not reflect the full natural range for bison. Throughout their range, bison inhabit woodlands and open plains and grasslands. Woodlands and openings in boreal forests, meadows, and river valleys are used in the northern parts of their range. Like other large grazers, they are attracted to burn areas during the next growing season (Shaw and Carter 1990). During the growing season at the Konza Prairie in northeastern Kansas, they preferred areas that had been burned in spring. Summer grazing was concentrated in a large watershed area (195 to 295 acres) dominated by warm-season, perennial C4 grasses. In fall and winter they grazed both burned and unburned watersheds more uniformly, but grazed most intensively in areas with large stands of cool-season, C3 grasses (Vinton et al. 1993).

Management

Bison are classified as a "game animal," "domestic livestock," or as a "species in need of disease control" respectively, depending on whether they are found in the wild, in privately held herds

(Adams and Dood 2011), or if their origin is YNP. Their classification also dictates which state agency has management authority, FWP, the Department of Livestock, or both agencies jointly.

Management of bison as wildlife in Montana has been controversial. The presence of brucellosis in these animals and their migration out of YNP into adjacent public and private lands has led to conflicts between private landowners, citizens, public administrative agencies, and public land management agencies. Bison as wildlife in Montana are currently managed under the *Interagency Bison Management Plan* (National Park Service 2000).

There are no permanent bison populations on an annual basis in Montana, and the current distribution of the only wild herd of bison in Montana is the YNP herd. Management of this herd is limited to small areas outside of YNP where they are tolerated. This bison herd is designated as "species in need of disease control" under Montana state statute. Hunting is allowed on this herd (generally mid-November through mid-February) when individuals leave the park and enter Montana. Four tribes also hunt bison that exit the park under existing treaty hunting rights.

The current YNP bison controversy needs to be addressed in a manner to reduce conflict while providing adequate habitat and management for long term persistence of this herd.

<u>Management Plan</u>

Montana Department of Livestock and Montana Fish, Wildlife & Parks. 2000. Interagency bison management plan. 70 pp.

National Park Service. 2000. Bison Management for the State of Montana and Yellowstone National Park. Final Environmental Impact Statement for the Interagency Bison Management Plan for the State of Montana and Yellowstone National Park. Vol. I. August 2000.

Bison Current Impacts, Future Threats, and Conservation Actions

Current Impacts	**Future Threats**	**Conservation Actions**
Existing genetically intact herds are not free ranging with the exception of the YNP herd which still is limited in range outside of Park borders	Existing genetically intact herds are not free ranging with the exception of the YNP herd which still is limited in range outside of Park borders	Establish disease-free bison populations as wildlife in suitable grassland habitats outside YNP where they can function ecologically and operate as keystone species to restore grassland systems Create populations of wild bison that can be harvested and provide economic and social benefits to Montana Work with landowners, other agencies, and NGOs to encourage bison tolerance outside of YNP

Current Impacts	Future Threats	Conservation Actions
Disease (brucellosis)	Disease risk in YNP	Follow recommendations in the *Interagency Bison Management Plan* (National Park Service 2000) Continue development of working relationships with landowners and other constituents

Northern Bog Lemming (*Synaptomys borealis*) State Rank: S2
Species of Greatest Inventory Need

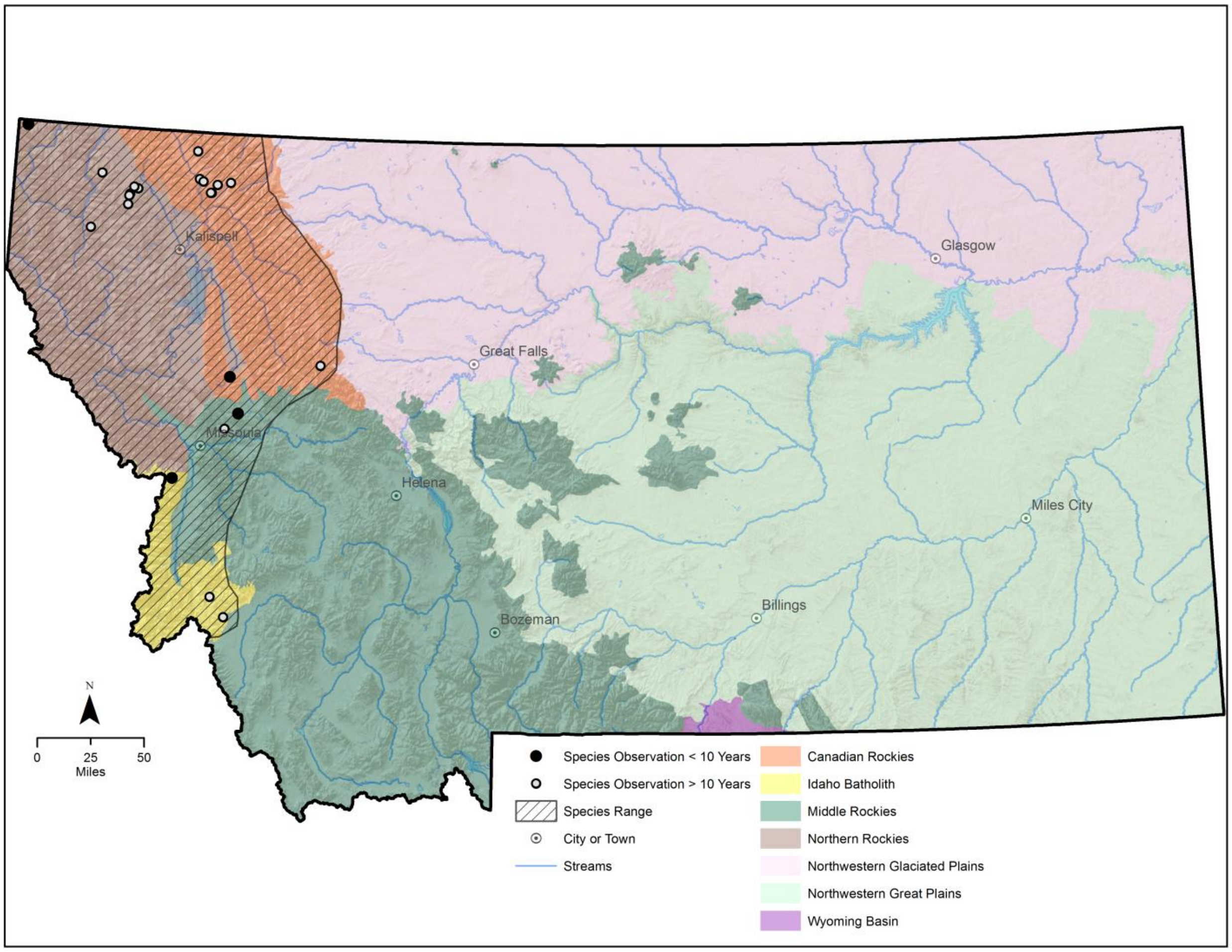

Figure 89. Montana range and observations of the northern bog lemming

Habitat

Northern bog lemmings occupy a variety of habitats throughout their range, especially near the southern edge of their global distribution. Typically, these habitats have high moisture levels and include sphagnum bogs, wet meadows, moist mixed and coniferous forests, montane sedge meadows, krummholz spruce-fir forests with dense herbaceous and mossy understory, alpine tundra, mossy streamsides, and even sagebrush slopes in the case of *S. b. artemisiae* in British Columbia (Clough and Albright 1987; West 1999; Streubel 2000). Within these habitats, they occupy surface runways and burrow systems up to 12 inches deep and can be found in small colonies with population densities that may reach 36 individuals per acre (Streubel 2000). They are active day and night throughout the year, feeding mostly on herbaceous vegetation (Foresman 2012). Young are born in nests that may be underground or on the surface in concealing vegetation. Northern bog lemmings in Montana have been found in at least nine habitat types, including Engelmann spruce, subalpine fir, birch, willow, sedge (*Carex*), spike rush (*Eleocharis*), or combinations of the above, often occurring in wet meadows, fens, or boglike environments. Wright (1950) captured lemmings in a swampy area containing spruce trees, timothy, alder, and other moist-site plants (Wright 1950). The Upper Rattlesnake Creek specimen was captured in a wet-sedge/bluejoint meadow near subalpine fir (Adelman 1979). Areas with extensive moss mats, primarily sphagnum, are the most likely sites to find new populations (Wright 1950; Reichel and Beckstrom 1994; Reichel and Corn 1997; Pearson 1999).

Management
No coordinated management activities have been developed or implemented for this species in Montana. Nevertheless, some populations on USFS lands are provided added protection through special management/conservation policy guidelines applied to peatlands, including the RNA designation (Chadde et al. 1998). RNA designation typically prohibits manipulative management, such as timber harvest and livestock grazing. The Clean Water Act and state water quality standards protect water quality of these peatlands. Protection guidelines (Reichel and Corn 1997) should be applied to all sites where northern bog lemmings are known to occur, as well as potential peatland sites not yet surveyed for the species.

Management Plan
None.

Northern Bog Lemming Current Impacts, Future Threats, and Conservation Actions

Current Impacts	Future Threats	Conservation Actions
Outdated survey Poorly understood distribution of the species in Montana		Conserve and/or restore unoccupied potential habitat Consider including species in other comprehensive taxonomic plans Monitor known sites routinely to determine population persistence and trends Explore non-invasive capture techniques, such as scat genetic analysis Target species for survey and inventory
Bogs/fens are threatened by incompatible range management practices, invasion of heavily grazed fens by exotic plants, and potential changes in the water regimes feeding the bogs/fens	Bogs/fens are threatened by incompatible range management practices, invasion of heavily grazed fens by exotic plants, and potential changes in the water regimes feeding the bogs/fens	Work with landowners and land management agencies to closely manage forest activities that may be detrimental to this species

Current Impacts	Future Threats	Conservation Actions
Conversion of forests to meadows by clearcutting, wildfire, or excessive thinning can increase populations of meadow voles and other species that compete with northern bog lemmings	Conversion of forests to meadows by clearcutting, wildfire, or excessive thinning can increase populations of meadow voles and other species that compete with northern bog lemmings	Maintain a buffer zone of 300 feet surrounding sphagnum or other fen moss mats or wetland areas that could provide corridors for dispersal to adjacent patches of suitable habitat
Human disturbances (timber harvesting and roads) are directly related to the decreased diversity of vascular plants, many of which are important to the diet of northern bog lemmings	Human disturbances (timber harvesting and roads) are directly related to the decreased diversity of vascular plants, many of which are important to the diet of northern bog lemmings	Work with landowners and land management agencies to limit activities that may be detrimental this species
	Climate change altering habitat characteristics (e.g., air and water temperature, precipitation timing and amount)	Continue to evaluate current climate science models and recommended actions Monitor habitat changes and address climate impacts through adaptive management as necessary Routinely monitor known populations

Arctic Shrew (*Sorex arcticus*) State Rank: S1S3

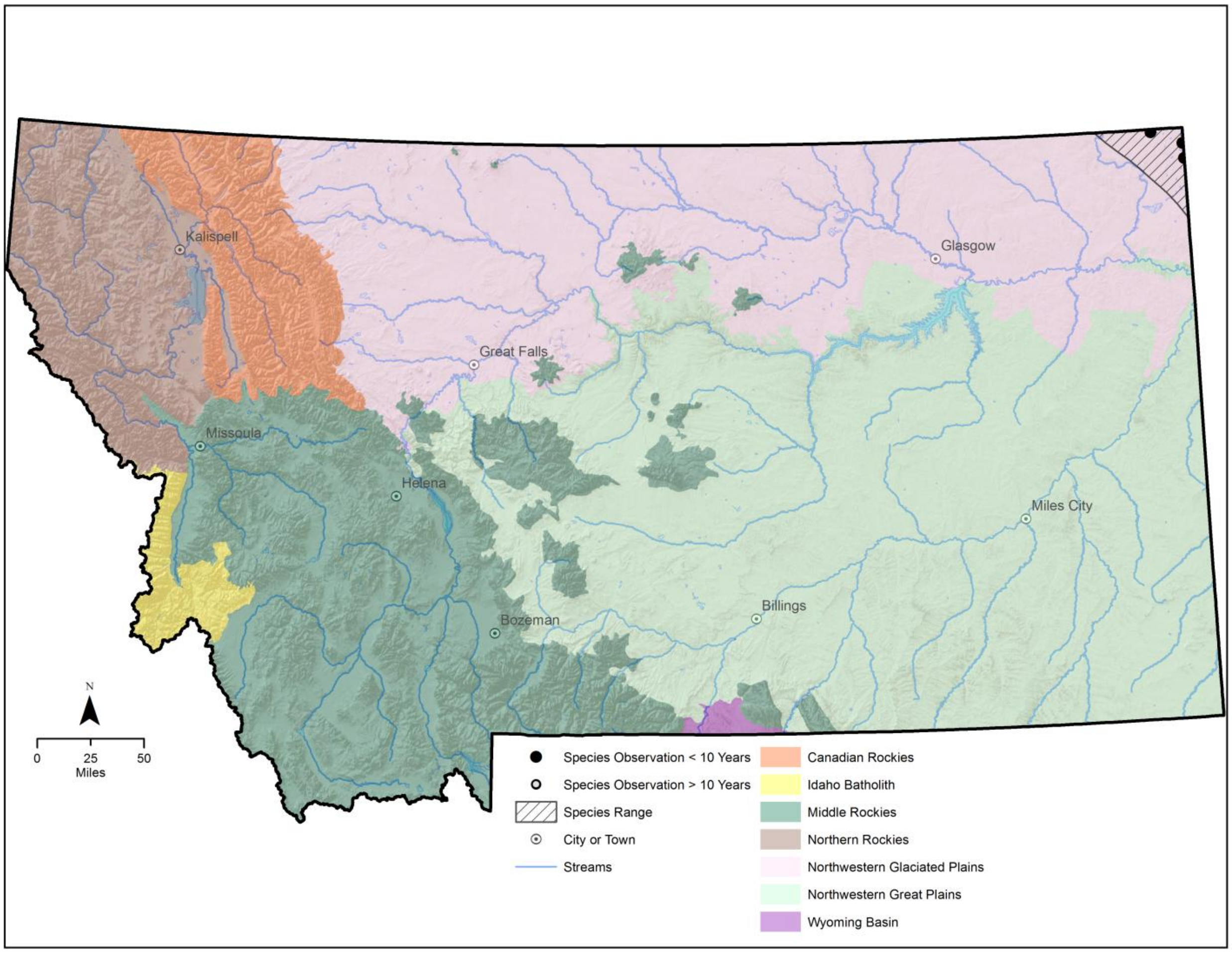

Figure 90. Montana range and observations of the arctic shrew

Habitat

Little is known about habitat requirements of the arctic shrew in Montana. All individuals captured were in wet meadows adjacent to marshes or in the sandy flats of creek floodplains (Foresman 2012).

Management

No management needs have been identified nor have any measures been enacted for the conservation of arctic shrew in Montana. Nevertheless, wetland drainage or alteration has the potential to negatively impact local populations. Additional surveys for arctic shrew can provide the basis for development of conservation protocols by determining its full distribution in Montana, the array of habitats in which it occurs, its relative abundance in different habitats, and if properly designed, an idea of how different habitat disturbances affect this shrew at the margin of its global range.

Management Plan

None.

Arctic Shrew Current Impacts, Future Threats, and Conservation Actions

Current Impacts	**Future Threats**	**Conservation Actions**
Data poor		Target species for survey and inventory
Conversion of native habitat to cropland agriculture	Conversion of native habitat to cropland agriculture	Protect habitat that is at highest risk of conversion to cropland through the possible use of easements acquisition Work with landowners and land management agencies to limit activities that may be detrimental to this species
Oil and gas development	Oil and gas development	Follow recommendations in FWP's *Fish and Wildlife Recommendations for Oil and Gas Development in Montana* (FWP In prep)
Wetland degradation or loss	Wetland degradation or loss	Work with landowners and land management agencies to limit activities that may be detrimental to this species

<u>Dwarf Shrew</u> (*Sorex nanus*) State Rank: S2S3

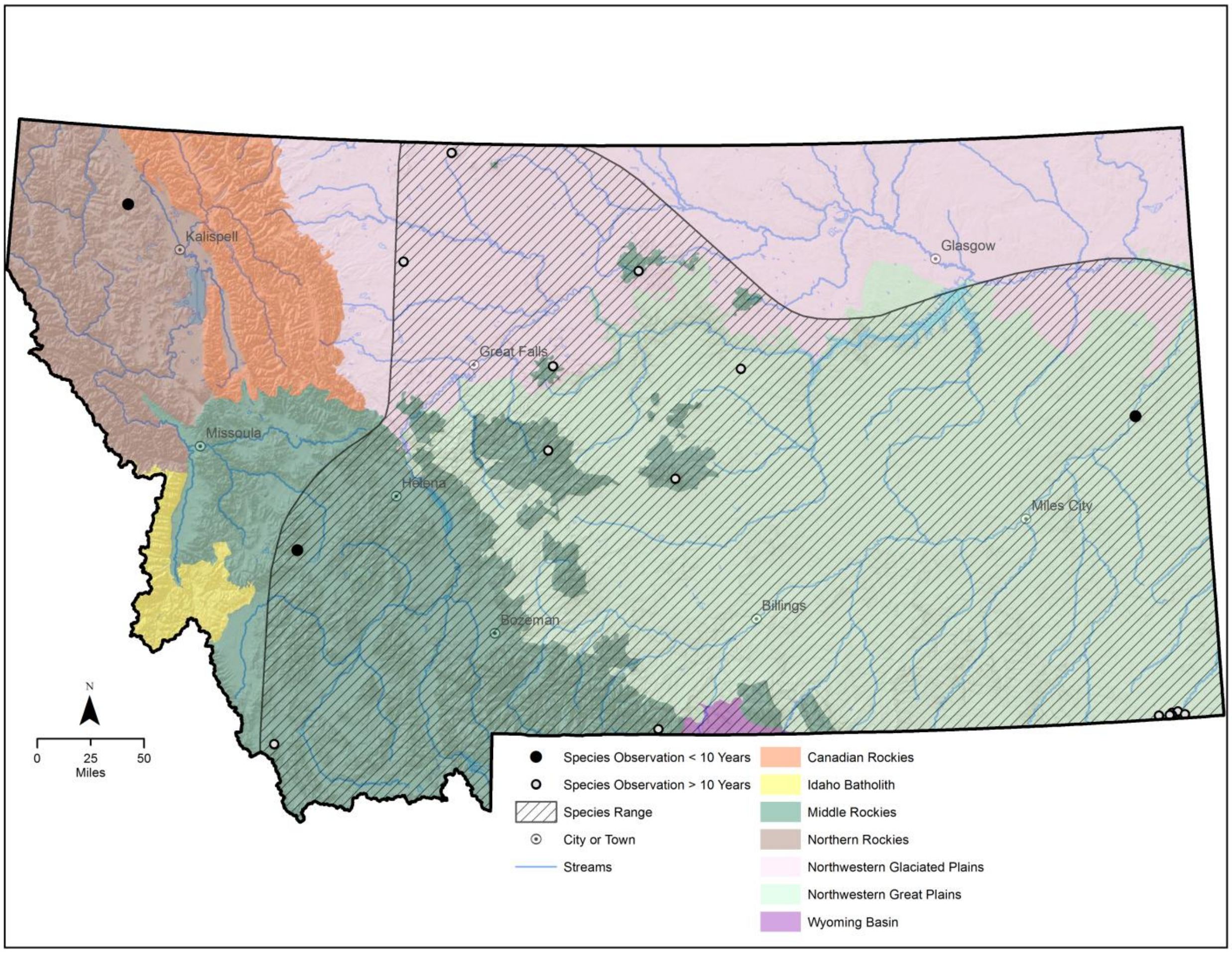

Figure 91. Montana range and observations of the dwarf shrew

<u>Habitat</u>

In general, the dwarf shrew is found in a variety of habitats, including rocky areas and meadows in alpine tundra and subalpine coniferous forest (spruce-fir), rocky slopes and meadows in lower-elevation forest (e.g., ponderosa pine, aspen, Douglas-fir) with a mixed shrub component, sedge marsh, subalpine meadow, arid sagebrush slopes, arid shortgrass prairie, dry stubble fields, and pinyon-juniper woodland (Hoffmann and Owen 1980, Berna 1990, Kirkland et al. 1997, Rickart and Heaney 2001, Hafner and Stahlecker 2002).

Habitats where dwarf shrews have been documented in Montana are similar in variety to those occupied elsewhere in the global range. Many have been taken in rocky locations in alpine terrain and subalpine talus (0.75 to four inches diameter) bordered by spruce-fir, lodgepole pine, or Douglas-fir and aspen; lesser numbers have been captured in montane grassland, sagebrush-grassland with 22% bare ground, and prairie riparian habitat dominated by green ash, rose, and timothy (Hoffmann and Taber 1960, Pattie and Verbeek 1967, Hoffmann et al. 1969, Thompson 1977, MacCracken 1985). Dwarf shrews appear to be adapted to many different habitat conditions (Foresman 2012).

Management
No management measures have been enacted for the dwarf shrew in Montana. However, alteration or removal of grassland and sagebrush through fire, herbicides, or mechanical methods, may impact local lower-elevation populations. Measures taken to protect a diversity of size and cover classes of grassland and sagebrush will likely contribute to the conservation of dwarf shrew. Reclamation/restoration of native prairie appears to provide some measure of effective mitigation for strip-mining activity in prairie regions (Kirkland et al. 1997), but this needs additional study. Surveys for dwarf shrew can provide the basis for development of conservation protocols by determining its full distribution in Montana, the array of habitats in which it occurs, its relative abundance in different habitats, and if properly designed, an idea of how different habitat disturbances affect this rare shrew.

Management Plan
None.

Dwarf Shrew Current Impacts, Future Threats, and Conservation Actions

Current Impacts	Future Threats	Conservation Actions
Data poor		Target species for survey and inventory

Northern Short-tailed Shrew (*Blarina brevicauda*) State Rank: S1S3

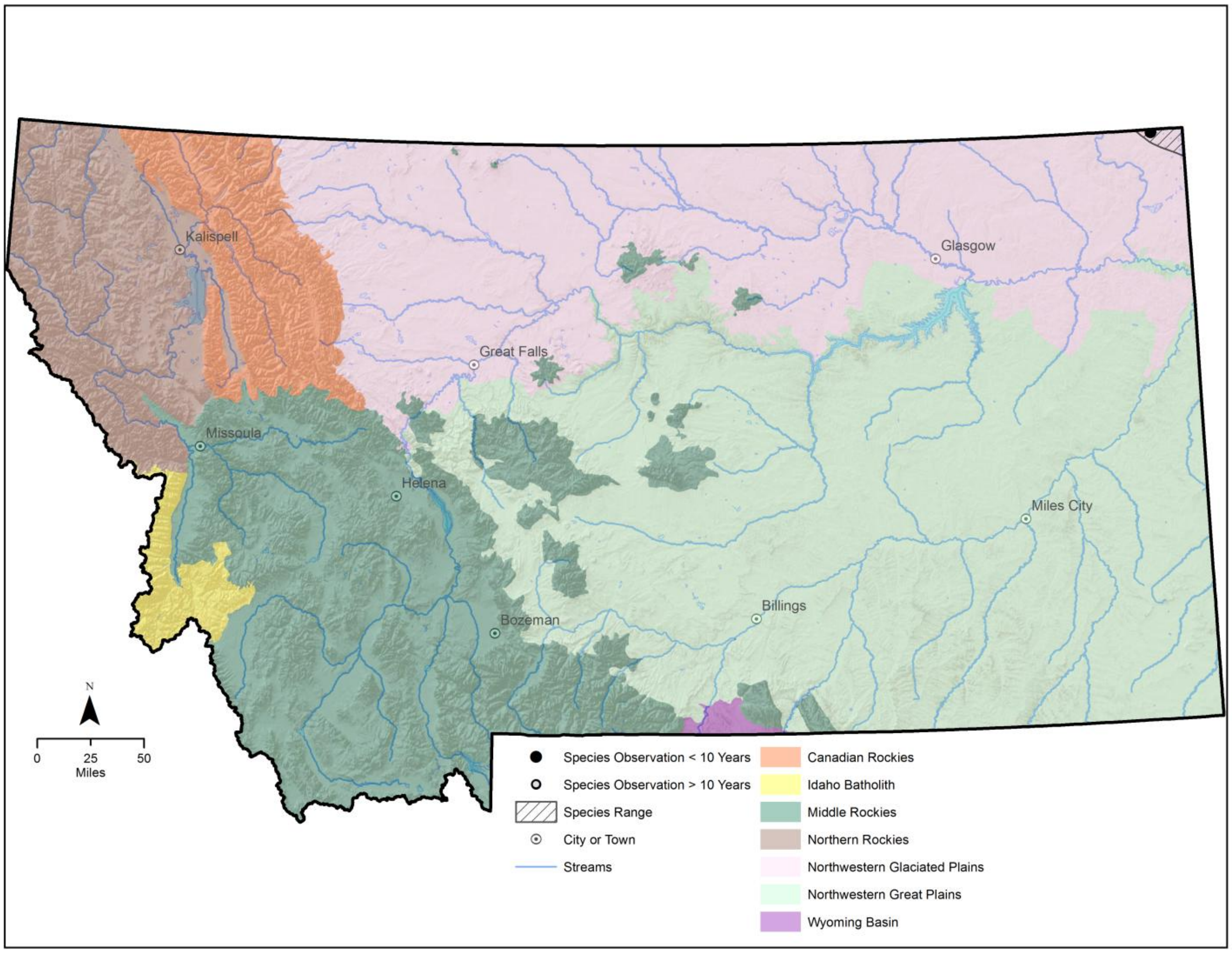

Figure 92. Montana range and observations of the northern short-tailed shrew

Habitat

Considered hypothetical in extreme northeastern Montana since at least 1968 (Hoffmann and Pattie 1968) until two were captured in August 2005 in Sheridan County in marshy, prairie pothole habitat about 1.4 miles south of the Saskatchewan border. Farther east, within the main range of the species, northern short-tailed shrews are most common in hardwood forests with deep leaf litter and in brushy sites adjacent to ponds and streams, and less common in conifer forest and grassland. In Manitoba this shrew is reported to be most common in grass-sedge marsh and willow-alder shrubs (Jones et al. 1983, van Zyll de Jong 1983, George et al. 1986). Northern short-tailed shrews seem to prefer wet areas, likely because the soil is loose for burrowing and there is a greater amount of prey (Foresman 2012).

Management

No management needs have been identified and no measures have been enacted to promote northern short-tailed shrew conservation in Montana. Wetland drainage or alteration, and loss of riparian vegetation (e.g. aspen, birch, willow, cottonwood) in woody draws and around springs or seeps, has the potential to negatively impact local populations. Additional surveys for the northern short-tailed shrew can provide the basis for development of conservation protocols by determining its full distribution in Montana, the array of habitats in which it occurs, its relative abundance in different habitats, and if properly designed, an idea of how different habitat disturbances affect this shrew at the margin of its global range.

Management Plan
None.

Northern Short-tailed Shrew Current Impacts, Future Threats, and Conservation Actions

Current Impacts	**Future Threats**	**Conservation Actions**
Data poor		Target species for survey and inventory
Conversion of native habitat to cropland agriculture	Conversion of native habitat to cropland agriculture	Protect habitat that is at highest risk of conversion to cropland through the possible use of easements acquisition Work with landowners and land management agencies to limit activities that may be detrimental to this species
Oil and gas development	Oil and gas development	Follow recommendations in FWP's *Fish and Wildlife Recommendations for Oil and Gas Development in Montana* (FWP In prep)
Wetland degradation or loss	Wetland degradation or loss	Work with landowners and land management agencies to limit activities that may be detrimental to this species

White-tailed Prairie Dog (*Cynomys leucurus*) State Rank: S1

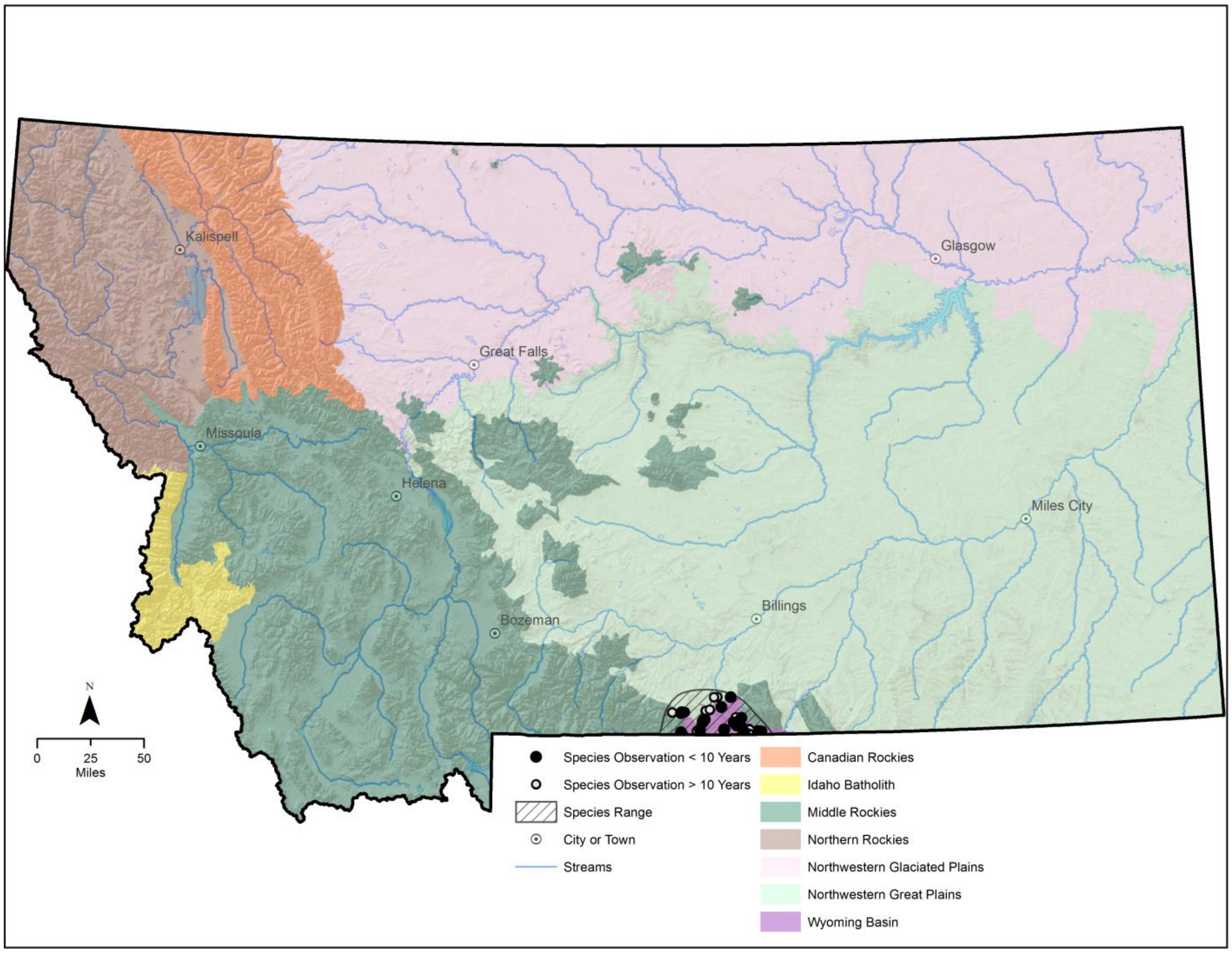

Figure 93. Montana range and observations of the white-tailed prairie dog

Habitat

Throughout their range, WTPDs inhabit xeric sites with mixed stands of shrubs and grasses. In Montana they inhabit sites dominated by Nuttall saltbrush with lesser amounts of big sage and areas with povery sumpweed (Flath 1979; Foresman 2012). They live at higher elevations and in meadows with more diverse grass and herb cover than do black-tailed prairie dogs (Hoffmann, in Wilson and Ruff 1999), and their range in Montana is at higher elevations than other sites within their distribution.

Management

Prairie dogs in Montana are currently an unregulated nongame species. Shooting of prairie dogs on public lands is allowed unless covered under a specific area closure, e.g., UL Bend on the Charles M. Russell NWR. WTPDs are managed under the *Conservation Plan for Black-tailed and White-tailed Prairie Dogs in Montana* (Montana Prairie Dog Working Group 2002). WTPDs were found to be not warranted for listing under the ESA in May, 2010. Threats to the species however remain throughout its range to include habitat conversion and loss and sylvatic plague.
Translocation of WTPD in south central Montana was intended to reestablish the species at colonies from which they had been extirpated and to provide prey and habitat for a variety of

other wildlife. Translocation was also intended to maintain a viable population of WTPD in Montana. FWP translocated 44 WTPD within Carbon County with these intentions in mind and to remove individuals at colonies under threat from highway re-alignment. WTPD conservation in Montana also benefitted from FWP's leadership of the Montana Prairie Dog Working Group as well as involvement with the Western Association of Fish and Wildlife Agencies' (WAFWA) efforts to conserve prairie dogs.

<u>Management Plans</u>

Bureau of Land Management. 1979. Habitat management plan for prairie dog ecotypes. BLM, Montana State Office. Wildlife Habitat Area MT-02-06-07-S1. 61 pp.

Montana Prairie Dog Working Group. 2002. Conservation Plan for Black-tailed and White-tailed Prairie Dogs in Montana. Montana Fish, Wildlife and Parks. Helena Montana. 51 pp.

White-tailed Prairie Dog Current Impacts, Future Threats, and Conservation Actions

Current Impacts	**Future Threats**	**Conservation Actions**
Habitat loss due to conversion of native rangelands to agriculture, and to a lesser degree, residential development	Habitat loss due to conversion of native rangelands to agriculture, and to a lesser degree, residential development	Continue to develop, refine, and implement financial incentives for landowners to maintain prairie dogs Support strategic conservation easements to enhance and protect important native habitat Work with landowners and land management agencies to limit activities that may be detrimental to this species
Disease, particularly sylvatic plague	Disease, particularly sylvatic plague	Assist in funding research projects targeting effects of disease on prairie ecosystems Use deltamethrin to protect prairie dog populations until a sylvatic plague vaccine is available Work through cooperative agreements with private landowners and land management agencies to manage for healthy populations of prairie dogs
Incompatible grazing practices	Incompatible grazing practices	Work with landowners and land management agencies to ensure species needs are adequately addressed in grazing and RMPs

Current Impacts	Future Threats	Conservation Actions
		Support livestock grazing management that maintains or improves native rangeland integrity Support research evaluating livestock grazing systems that enhance WTPD habitat features and ultimately WTPD populations
	Climate change altering habitat characteristics (e.g., air and water temperature, precipitation timing and amount)	Continue to evaluate current climate science models and recommended actions Monitor habitat changes and address climate impacts through adaptive management as necessary

Black-footed Ferret (*Mustela nigripes*) State Rank: S1

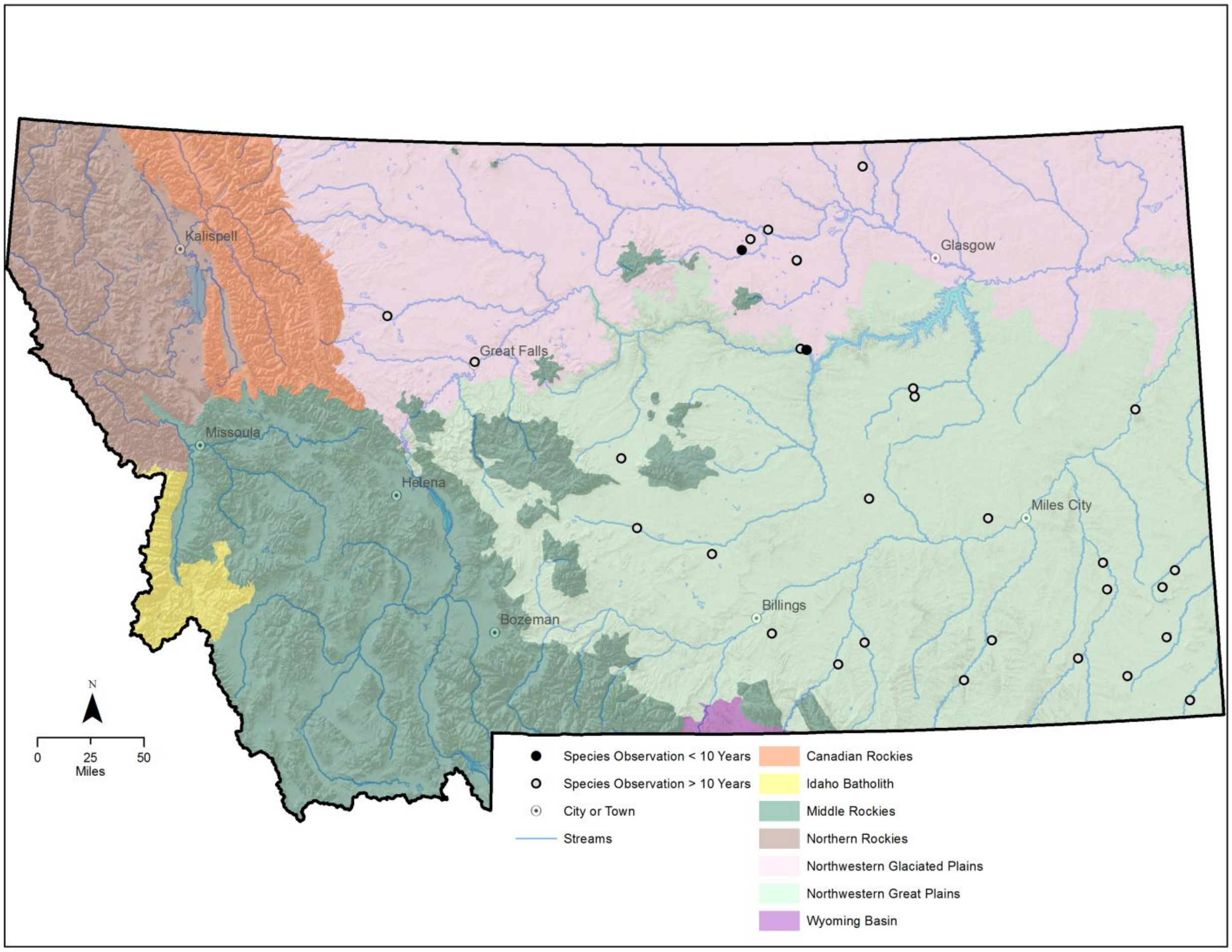

Figure 94. Montana observations of the black-footed ferret

Habitat

Black-footed ferrets are intimately tied to prairie dogs (*Cynomys* spp.) throughout their range and have only been found in association with prairie dogs. They are therefore limited to the same open habitat used by prairie dogs: grasslands, steppe, and shrub-steppe. Black-footed ferrets do not dig their own burrows, but instead rely on abandoned prairie dog burrows for shelter and rearing kits. Only large complexes (several thousand acres of closely spaced colonies) can support and sustain a breeding population of black-footed ferrets. It has been estimated that about 100 to 150 acres of prairie dog colony is needed to support one ferret, and females with litters have never been found on colonies smaller than 120 acres (Miller et al. 1996). Ferrets scent-mark to maintain spatial separation (Richardson 1986).

Management

Black-footed ferrets have been extirpated from most of their former large range largely as a result of loss of habitat due to prairie dog control programs, conversion of native prairie to cropland, and disease (USFWS 2013b) and have been listed as endangered since 1967. Canine distemper and sylvatic plague, in conjunction with captures for captive breeding, resulted in extirpation of the last known wild population near Meeteetse, Wyoming, by early 1987. See

Miller et al. (1996) for more information on the discovery of the Meeteetse ferrets and subsequent distemper-caused decline and captive breeding decisions that occurred in 1985. Currently the only known surviving populations are the result of captive-bred ferret reintroductions. Reintroductions have occurred in Montana on federal and tribal land since 1994 with varying success. Predation by coyotes and badgers and the loss of prairie dogs to sylvatic plague appear to be the primary failures of reintroduction efforts. Some wild reproduction has occurred, but no self-sustaining populations have been established in Montana.

In Montana, the goal is to reestablish two viable populations with a minimum of 50 breeding adults in each (FWP 2013f). Nationwide, the objective is to increase the captive population to 280 breeding adults and to establish a wild pre-breeding population of 1,500 adults in 10 or more locations by 2020 (USFWS 2013b). A Programmatic Safe Harbor Agreement with 12 states was completed in October 2013. This is an important step to recover this species.

Management Plans

Anderson, M. E. et al. 1978. Black-footed ferret recovery plan. U.S. Fish and Wildlife Service Black-footed Ferret Recovery Team. 150 pp.

Bureau of Land Management. 1979. Habitat management plan prairie dog ecotypes. BLM, Montana State Office. Wildlife Habitat Area MT-02-06-07-S1. 61 pp.

Christopherson, D., R. Stoneberg, R. Matchett, D. Biggins, J. Grensten, A. Dood, B. Haglan. 1994. Black-footed ferret reintroduction in Montana: project description and 1994 protocol. 31 pp plus appendix.

Montana Fish, Wildlife & Parks. 1992. North-central Montana black-footed ferret reintroduction and management plan. Prepared by North Central Montana Working Group. 59 pp.

U.S. Fish and Wildlife Service. 1988. Black-footed ferret recovery plan. Denver, Colorado. 154 pp.

U.S. Fish and Wildlife Service. 1994. Endangered and threatened wildlife and plants: establishment of a nonessential experimental population of black-footed ferrets in north-central Montana; final rule. Federal Register 59:42696-42715.

U.S. Fish and Wildlife Service. 2013. Recovery plan for the black-footed ferret (*Mustela nigripes*). Denver, Colorado. 157 pp.

Black-footed Ferret Current Impacts, Future Threats, and Conservation Actions

Current Impacts	**Future Threats**	**Conservation Actions**
Disease, such as canine distemper and sylvatic plague	Disease, such as canine distemper and sylvatic plague	Continue monitoring diseases that impact the health of populations and support research working to identify prevention measures

Current Impacts	Future Threats	Conservation Actions
		Vaccinate black-footed ferrets in the wild against sylvatic plague and canine distemper
Lack of prey base due to declining prairie dog colonies	Lack of prey base due to declining prairie dog colonies	Use oral plague vaccine, if proven effective, on prairie dog towns that ferrets use or where ferrets may be released Continue to develop, refine, and implement financial incentives for landowners to maintain prairie dogs Work with private landowners and land management agencies through cooperative agreements to manage for healthy populations of prairie dogs Continued management and potential enhancement to prairie dog colonies Use deltamethrin to protect prairie dog populations until a sylvatic plague vaccine is available Construct vegetative barriers and use grazing to manage undesired prairie dog colony expansion surrounding reintroduction sites Develop black-footed ferret conservation plans to expand prairie dog habitat at existing and potential reintroduction sites Seek authorization to regulate take of prairie dogs where take might be affecting ferret recovery

Current Impacts	**Future Threats**	**Conservation Actions**
Reduction of habitat	Reduction of habitat	Continue to develop, refine, and implement financial incentives for landowners to maintain prairie dogs Support strategic conservation easements to enhance and protect important native habitat Work with landowners and land management agencies to limit activities that may be detrimental to this species and stress the importance to maintain healthy habitats for black-footed ferrets Provide incentives to maintain grazed grasslands over conversion to croplands
Failed success of reintroduction efforts	Failed success of reintroduction efforts	Continue supporting future reintroduction efforts based on the adaptive management paradigm
Lack of funding for continued reintroduction efforts	Lack of funding for continued reintroduction efforts	Collaborate with partners to find additional funding for reintroduction efforts
	Climate change altering habitat characteristics (e.g., air and water temperature, precipitation timing and amount)	Continue to evaluate current climate science models and recommended actions Monitor habitat changes and address climate impacts through adaptive management as necessary

Reptiles

Milksnake (*Lampropeltis triangulum*) State Rank: S2

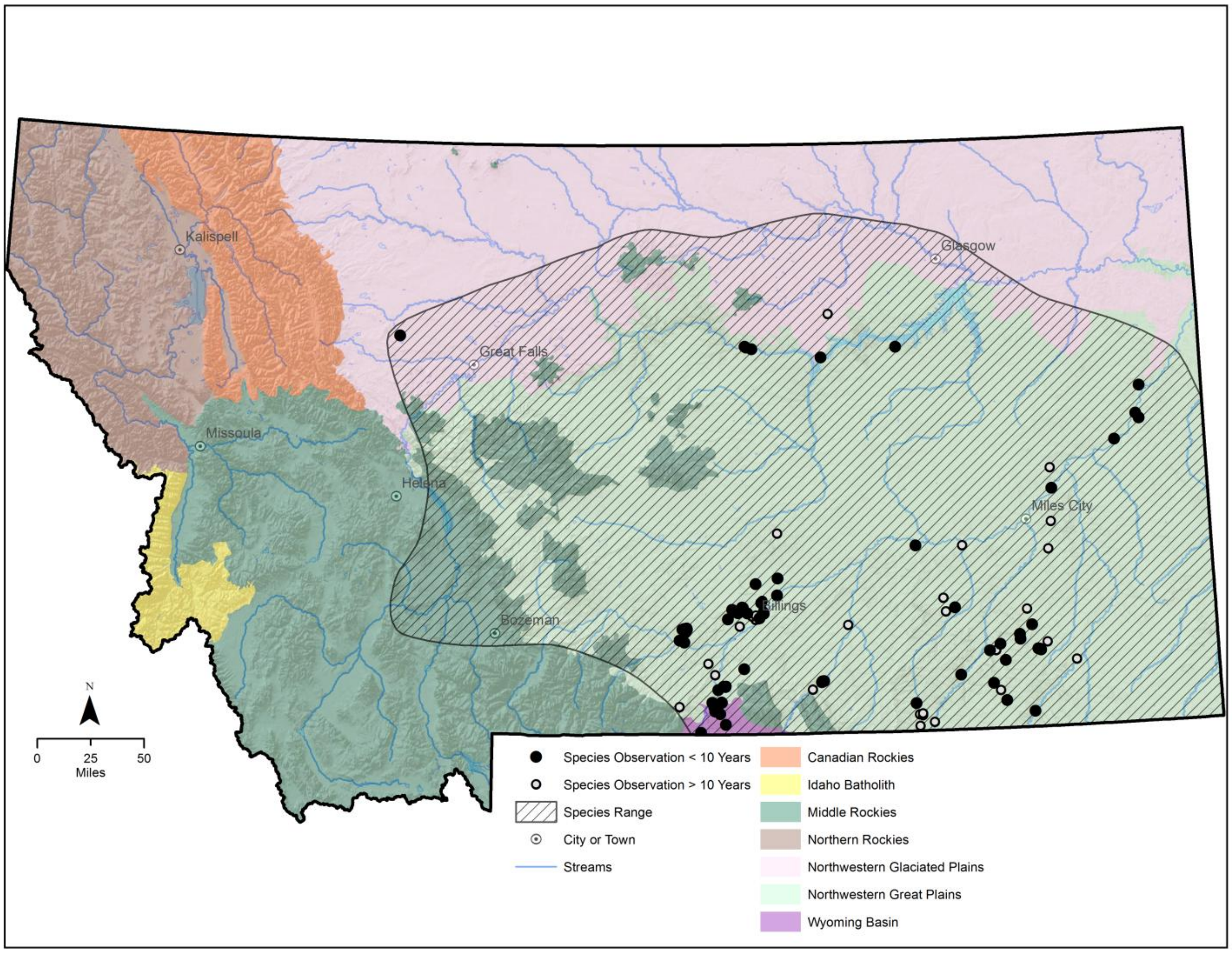

Figure 95. Montana range and observations of the milksnake

Habitat

Little specific information is available for this species. Milksnakes have been reported in areas of open sagebrush grassland habitat (Dood 1980) and ponderosa pine savannah with sandy soils (Hendricks 1999; B. Maxell, personal communication; L. Vitt, personal communication), most often in or near areas of rocky outcrops and hillsides or badland scarps, sometimes within city limits.

Management

So few recent milksnake records exist for Montana (Maxell et al. 2003) that it is difficult to determine if management activity is needed. Nevertheless, the widely scattered recent records indicate that milksnakes continue to occupy a large part of the known range in the state, and some sites near a large urban center have remained occupied for the last 40 to 45 years (L. Vitt, personal communication). Management for this species is hampered by a lack of basic information on abundance, food habits, and habitat associations.

Management Plan
None

Milksnake Current Impacts, Future Threats, and Conservation Actions

Current Impacts	Future Threats	Conservation Actions
Distribution, status, and biology are poorly understood	Distribution, status, and biology are poorly understood	Develop a comprehensive taxonomic management plan (e.g., for reptiles) that includes the milksnake Specifically survey for this species in suitable habitat to further define its range in Montana
Pet trade industry	Pet trade industry	Increase public education and information on reptile biology and raise awareness of the importance of den and nest sites

Smooth Greensnake (*Opheodrys vernalis*) State Rank: S2
Species of Greatest Inventory Need

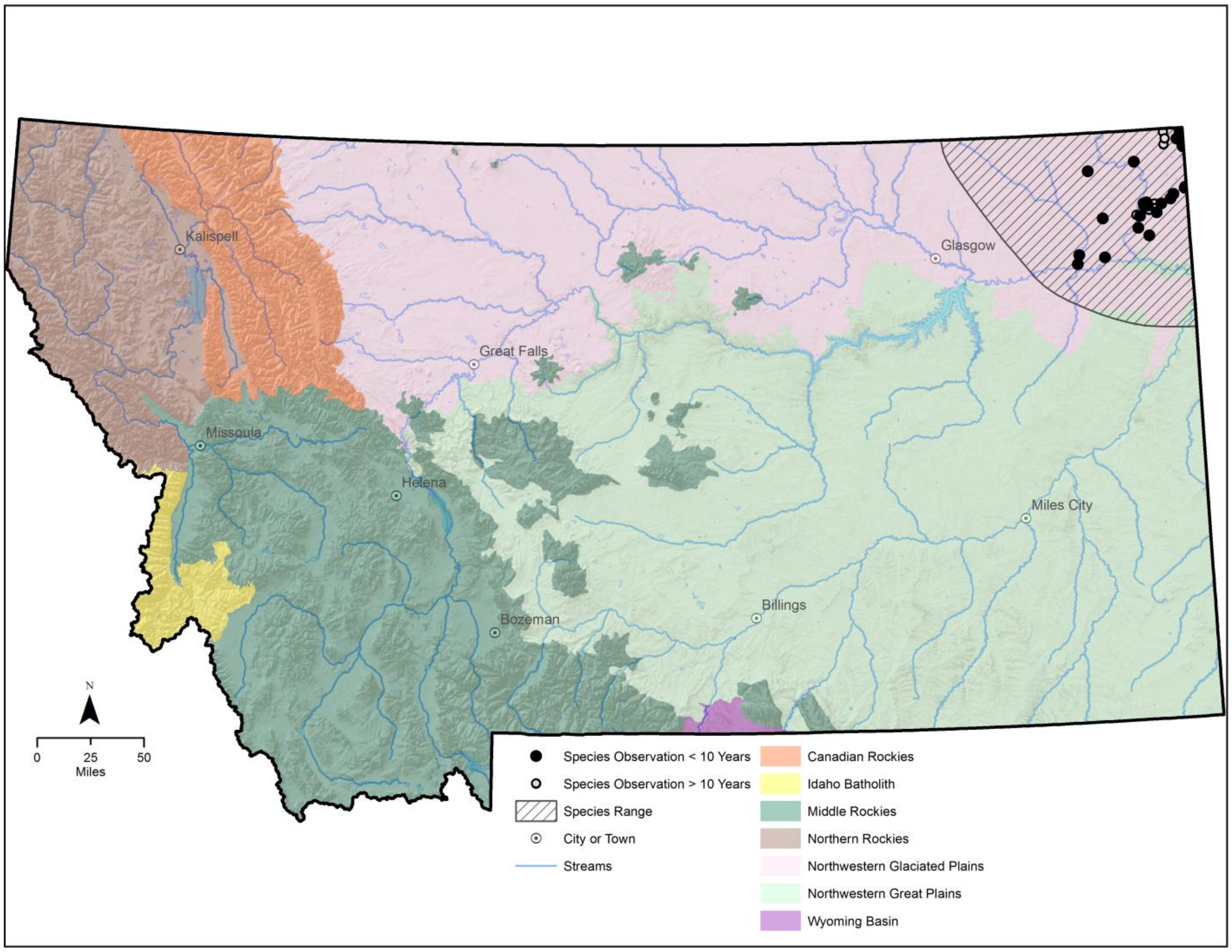

Figure 96. Montana range and observations of the smooth greensnake

Habitat
Little information is available for the species in Montana, though it has been reported on residential lawns, in city parks, along ditches in the prairie pothole region, and around wetland complexes. Based upon observations outside Montana, the smooth greensnake is known to occupy meadows, grassy marshes, moist grassy fields at forest edges, mountain shrublands, stream borders, bogs, open moist woodlands, abandoned farmlands, and vacant lots. Periods of inactivity are spent underground, beneath woody debris and rocks, or in rotting wood. Smooth greensnakes have been found hibernating in abandoned ant mounds. Most activity is restricted to the ground, but they may climb into low vegetation and sometimes enter water (Hammerson 1999). This species may also be found in damp meadows bordering streams and lakes as well as drier, rocky areas, but usually only if grass or similar vegetation is present.

Management Plan
None

Smooth Greensnake Current Impacts, Future Threats, and Conservation Actions

Current Impacts	**Future Threats**	**Conservation Actions**
Distribution, status, and biology in Montana are poorly understood Lacks baseline survey		Develop a comprehensive taxonomic management plan (e.g., for reptiles) that includes the smooth greensnake Specifically survey for this species in suitable habitat to further define its range in Montana
Conversion of native habitat to cropland agriculture	Conversion of native habitat to cropland agriculture	Protect habitat that is at highest risk of conversion to cropland through the possible use of easements acquisition Work with landowners and land management agencies to limit activities that may be detrimental to this species
Oil and gas development	Oil and gas development	Follow recommendations in FWP's *Fish and Wildlife Recommendations for Oil and Gas Development in Montana* (FWP In prep)
Pet trade industry	Pet trade industry	Increase public education and information on reptile biology and raise awareness of the importance of den and nest sites
Wetland degradation or loss	Wetland degradation or loss	Work with landowners and land management agencies to limit activities that may be detrimental to this species

Western Hog-nosed Snake (*Heterodon nasicus*) State Rank: S2
Species of Greatest Inventory Need

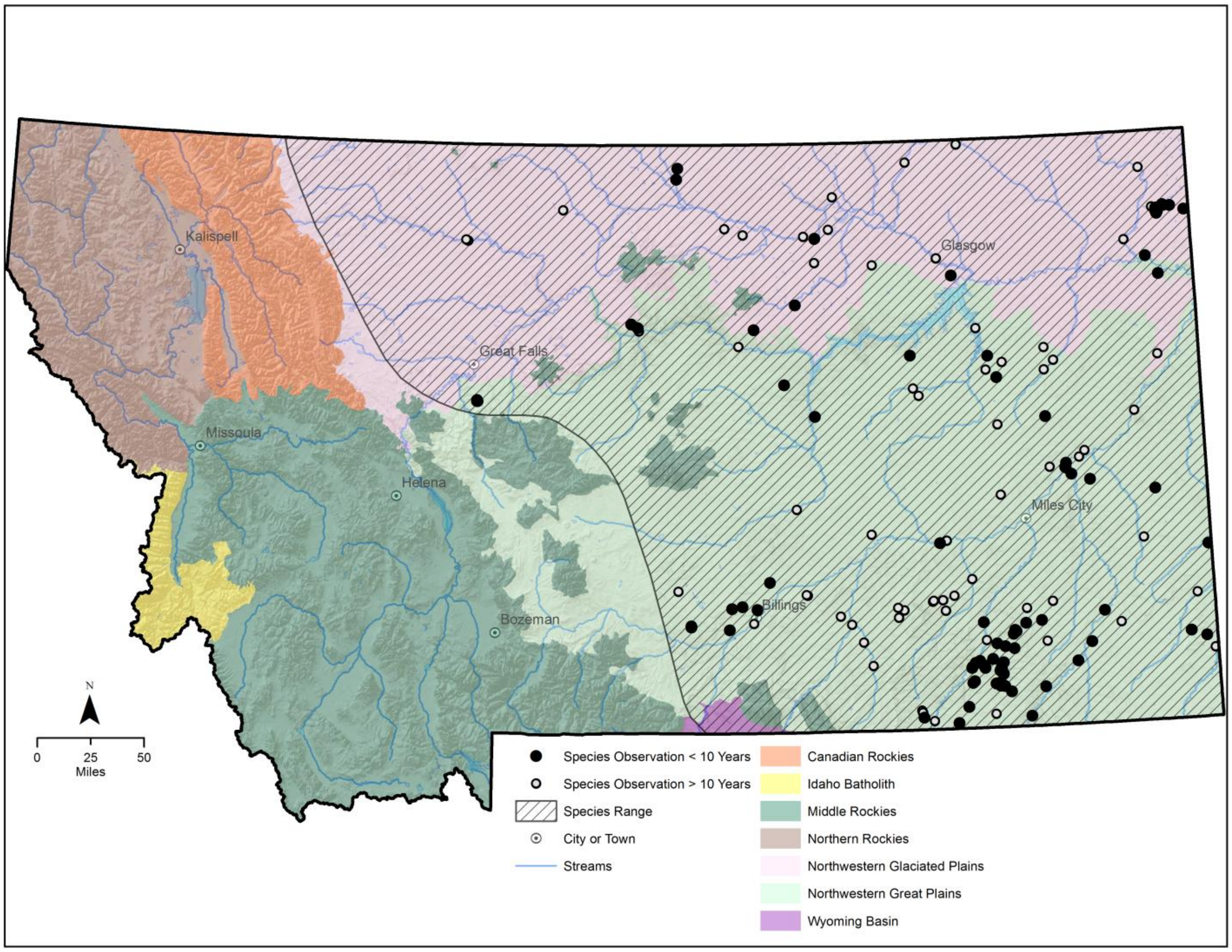

Figure 97. Montana range and observations of the western hog-nosed snake

Habitat
Little specific information for this species in Montana is available. Western hog-nosed snakes have been reported in areas of sagebrush grassland habitat (Dood 1980) and near pine savannah in grassland underlain by sandy soil (Reichel 1995; Hendricks 1999).

In other locations, their apparent preference for arid areas, farmlands, and floodplains, particularly those with gravelly or sandy soil, has been noted. They occupy burrows or dig into soil and can be found under rocks or debris during periods of inactivity (Baxter and Stone 1985; Hammerson 1999; Stebbins 2003).

Management
Apparently the western hog-nosed snake was relatively abundant in Montana during the late 19th Century, at least in some regions; in 1876 it was the third most common reptile (after the prairie rattlesnake and greater short-horned lizard) along the Missouri River between Fort Benton and the mouth of the Judith River (Cope 1879). The few recent records suggest now the species is uncommon throughout Montana, although its status is largely unknown. Even though this snake

is still encountered across its historical range, it is less abundant than in the 19th century probably due to extensive habitat loss associated with conversion of prairie to agricultural landscapes. As in other regions, an unknown percentage of local populations experience road mortality, as many specimen and observation records are of road-killed individuals. Draining of prairie wetlands may have negative impacts on the prey (toads and frogs particularly, and perhaps turtle eggs) this snake prefers. Management in Montana for this species is hampered by a lack of basic information on abundance, food habits, and habitat associations, but is probably best affected for the long-term by protecting suitable prairie habitats from conversion to agricultural uses.

Management Plan
None

Western Hog-nosed Snake Current Impacts, Future Threats, and Conservation Actions

Current Impacts	Future Threats	Conservation Actions
Distribution, status, and habitat uses are poorly understood Lacks baseline survey		Develop a comprehensive taxonomic management plan (e.g., for reptiles) that includes the western hog-nosed snake Target species for survey and inventory suitable habitat to further define its range in Montana
Declines in prey (amphibians)	Declines in prey (amphibians)	Survey for both western hog-nosed snakes and their prey base in suitable habitat to continue determining their abundance and range in Montana, as well as availability of prey Work with landowners and other agencies to limit activities that may be detrimental to wetlands and amphibians
Dependent on natural flood regimes that provide gravel and sandy beaches in which they and their amphibian prey can burrow	Dependent on natural flood regimes that provide gravel and sandy beaches in which they and their amphibian prey can burrow	Maintain natural flood regime Work with landowners and other agencies to establish natural flows
Pet trade industry	Pet trade industry	Increase public education on reptile biology and raise awareness of the importance of den and nest sites
Some evidence for declines are potentially associated with habitat loss	Some evidence for declines are potentially associated with habitat loss	Work with landowners and land management agencies to limit activities that may be detrimental to wetlands and amphibians